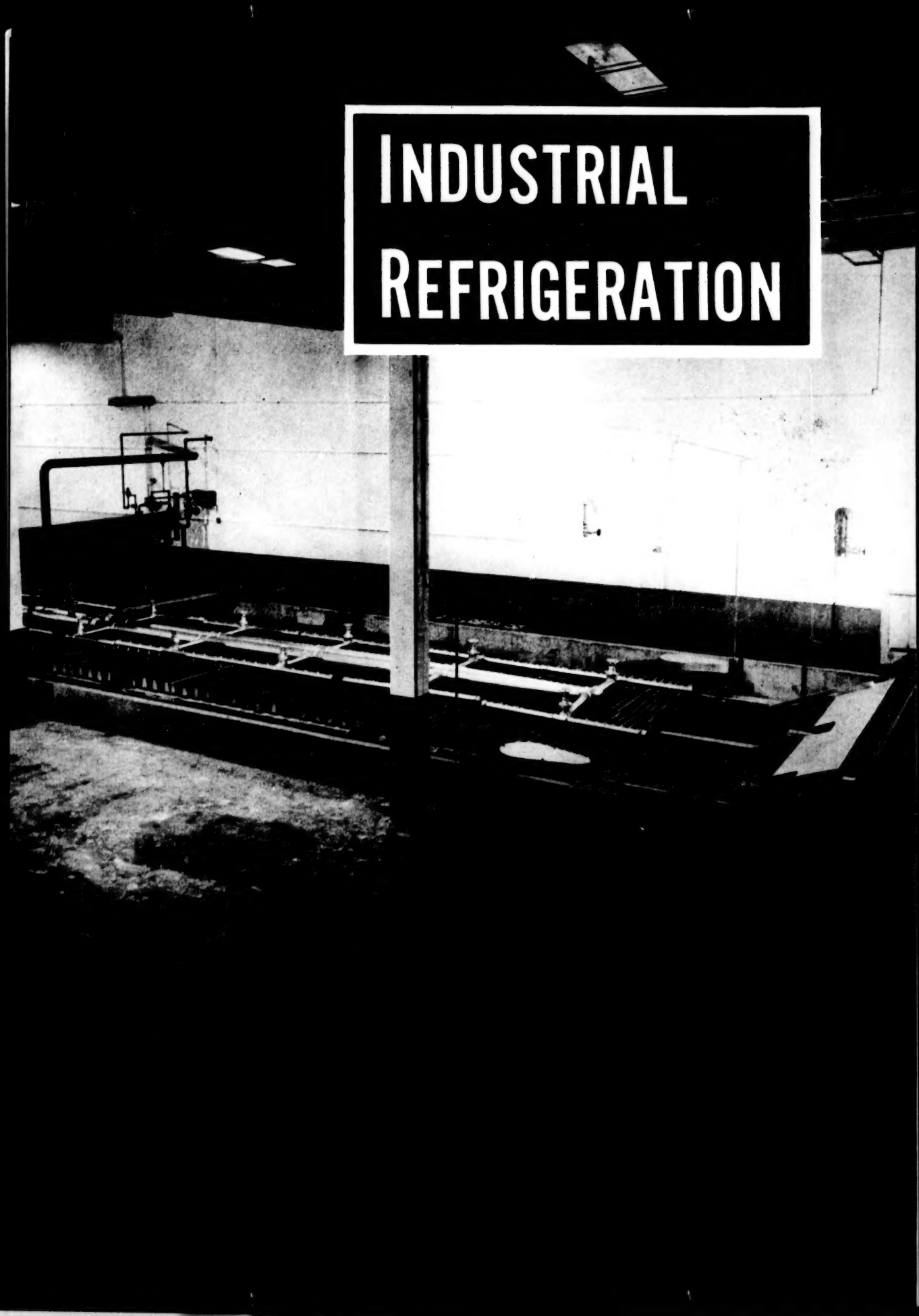
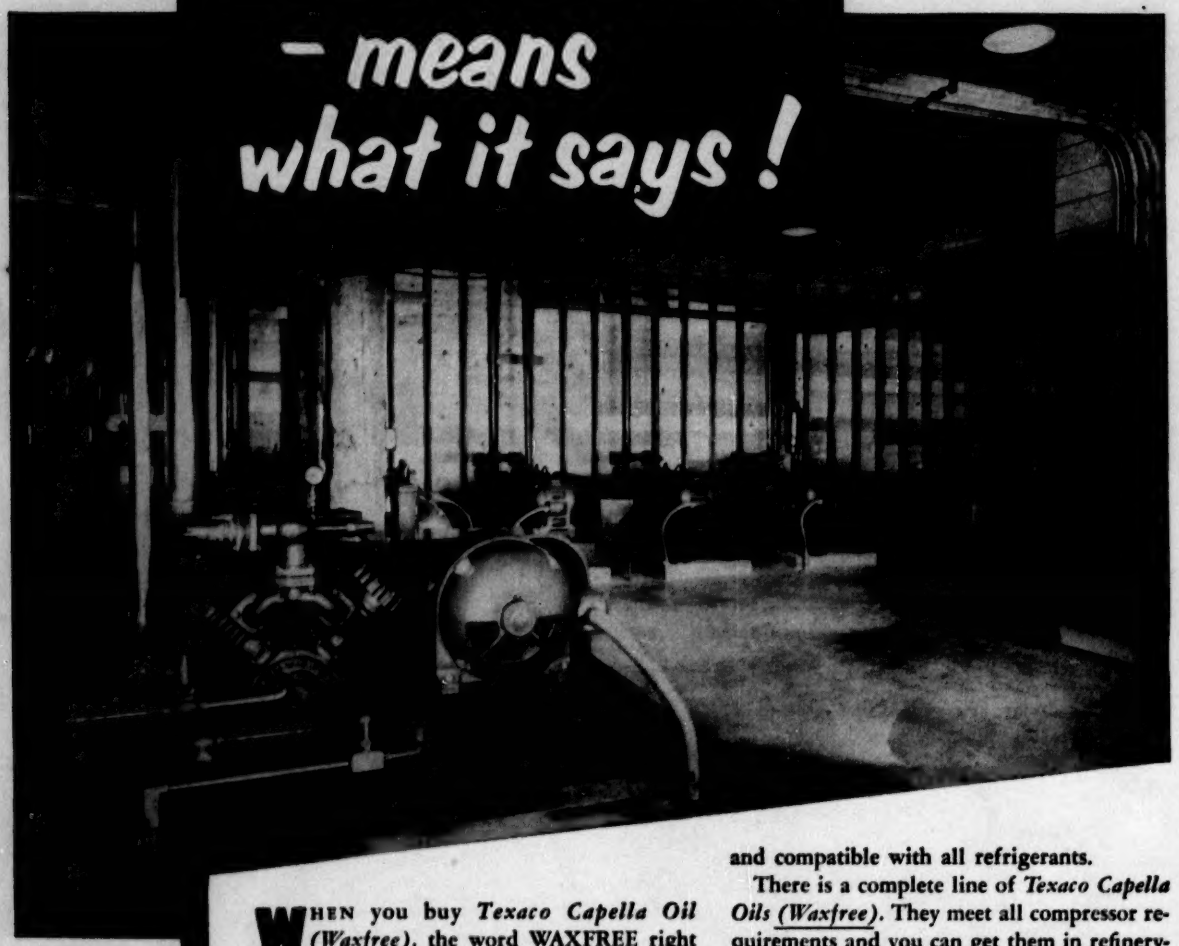

INDUSTRIAL
REFRIGERATION

WAXFREE
– means what it says!



WHEN you buy *Texaco Capella Oil (Waxfree)*, the word WAXFREE right on the container means you'll have *no wax precipitation in the system*—not even when you go down to minus 100 degrees F. That's why you can count on *Texaco Capella Oil (Waxfree)* to keep compressors running smoothly, dependably and economically.

Texaco Capella Oil (Waxfree) has exceptionally low haze and floc temperatures, outstanding stability and resistance to oxidation. Moreover, it does not foam, is moisture-free and compatible with all refrigerants.

There is a complete line of *Texaco Capella Oils (Waxfree)*. They meet all compressor requirements and you can get them in refinery-sealed 55-gallon and 5-gallon drums, 1-gallon cans, and the more popular grades in 1-quart containers.

A Texaco Lubrication Engineer will gladly help you choose the one to assure highest efficiency. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

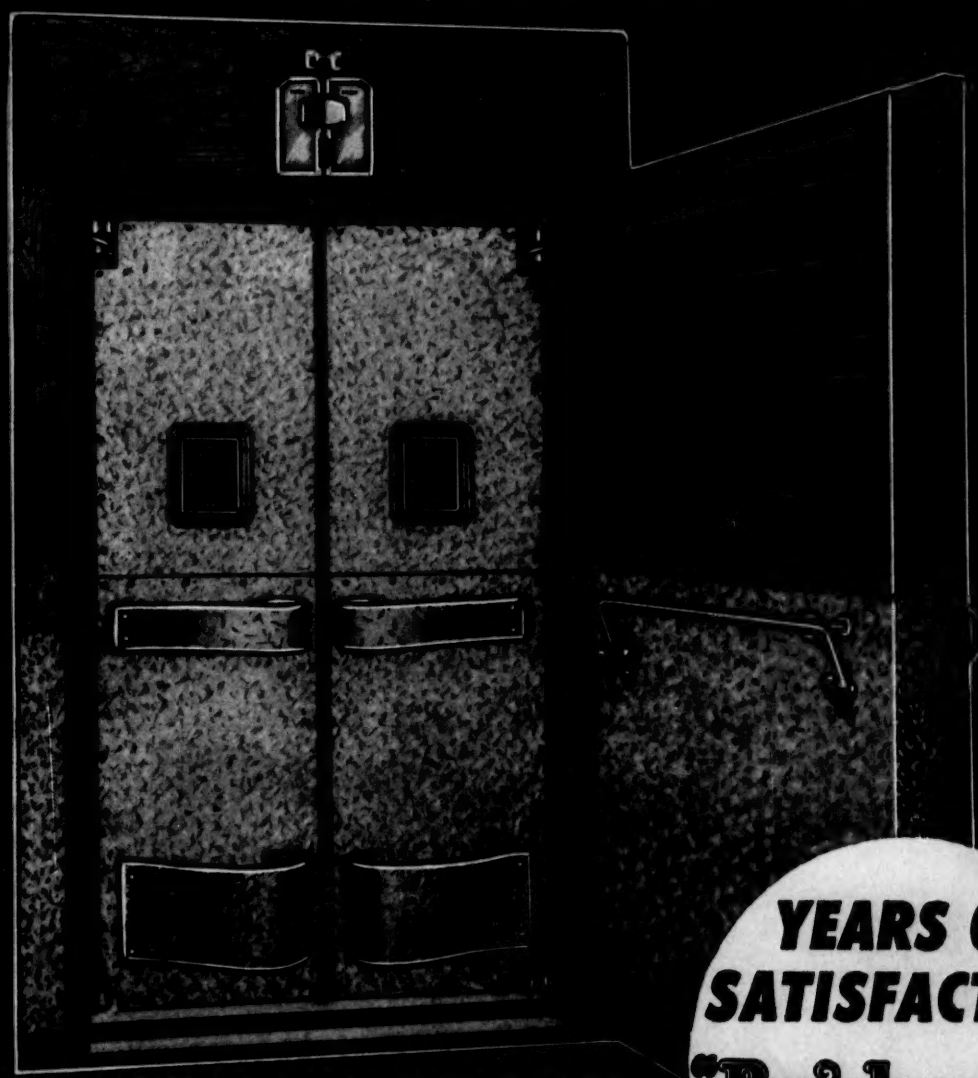
The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Capella Oils (Waxfree)

FOR ALL REFRIGERATING AND AIR CONDITIONING COMPRESSORS

TUNE IN: TEXACO STAR THEATER starring DONALD O'CONNOR or JIMMY DURANTE, on TV Sat. nights. METROPOLITAN OPERA radio broadcasts Sat. afternoons.



VESTIBULE TYPE TRACK DOOR

YEARS OF SATISFACTION

"Butcher Boy"

Quality Since 1885

WHY "BUTCHER BOY" DOORS ARE THE FINEST REFRIGERATOR DOORS BUILT!

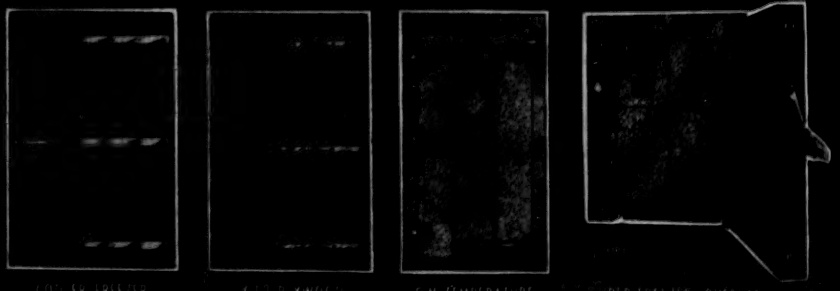
These Exclusive Features Furnished At No Extra Cost

DOOR STRUCTURE

HARDWARE

APPEARANCE

When a Man Thinks Twice ...He Makes Comparisons

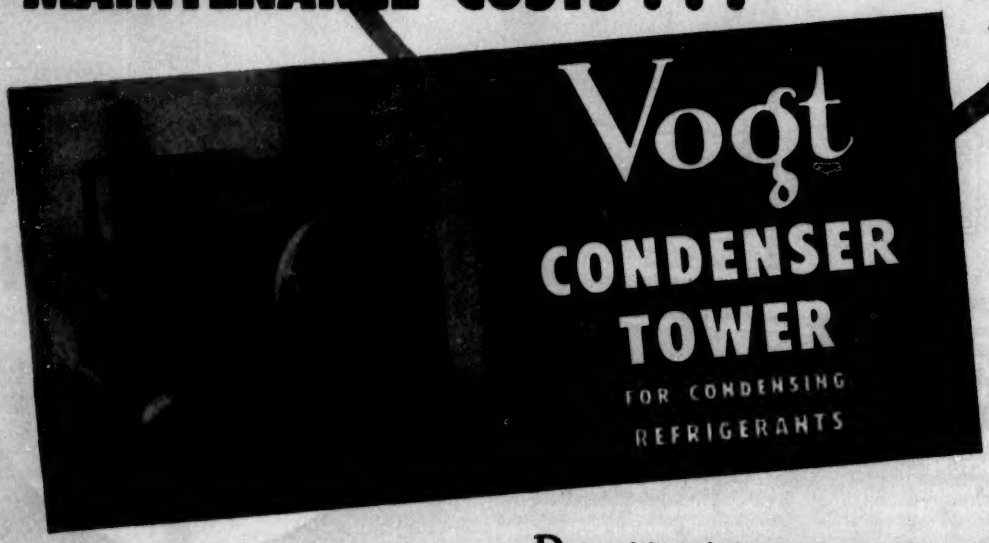


BUTCHER BOY REFRIGERATOR DOOR CO. HARVARD, ILLINOIS

New

SAVES WATER and CUTS MAINTENANCE COSTS . . .

Illustration shows two views of a 55 ton Condenser Tower prior to partial disassembly for shipment.



SINGLE RESPONSIBILITY:

Vogt, leading builder of refrigeration condensers, assumes responsibility for engineering the unit. Only one purchase order needed.

SHOP FITTED:

To cut down field assembly labor. Requires no cutting or fitting of pipe.

Designed for today's water conservation requirements, and to keep refrigeration costs low, the *new* Vogt Condenser Tower meets the need for a proven, readily cleanable condensing unit.

The Vogt Condenser Tower consists of a multipass straight tube condenser, a receiver, an oil trap, a cooling tower, and a water pump. Removable cast iron heads permit easy cleaning of the condenser tubes.

Water costs are extremely low since the cooling water is recirculated continuously and requires only a small amount of makeup to replace losses due to windage and evaporation.

Condenser Tower units are available in capacities ranging from 5 to 50 tons refrigeration. Additional information will be furnished upon request.

HENRY VOGT MACHINE CO., Louisville 10, Kentucky

BRANCH OFFICES NEW YORK PHILADELPHIA CLEVELAND CHICAGO ST LOUIS DALLAS CHARLESTON W VA

LETTERS

(Letters to the editor are welcome from readers of INDUSTRIAL REFRIGERATION on any subject of general interest.)

Insurance Article Reaps Bouquets

Colorado Springs, Colo.

THE article on insurance in your February issue was okay and informative.

H. C. DIEHL, DIRECTOR
Refrigeration Research Foundation

Washington, D.C.

THANKS for letting us take a look at the proofs of the insurance article for your February issue. This is a subject which is always of interest to refrigerated warehousemen. It is discussed at almost every annual meeting. Your article seems to touch on all of the most important coverages and we believe our members will find it both helpful and interesting.

WILLIAM DALTON
National Association of
Refrigerated Warehouses

Washington, D.C.

WE appreciate the opportunity of seeing the page proofs of the insurance article which you featured in the February issue of INDUSTRIAL REFRIGERATION. I have read the story with a great deal of interest. I think the author has done an excellent job in analyzing the insurance problem faced by the average company in this Industry, and in making constructive suggestions for meeting it.

C. P. AUSTIN, DIRECTOR
Research and Marketing
National Association of
Ice Industries

Is Your Insurance Coverage Up-To-Date?

IS your insurance based on current market value? Does it reflect changes in plant, equipment and machinery? Are all of your risks adequately protected?

The feature story in the February issue of INDUSTRIAL REFRIGERATION is a frank, factual analysis of insurance as it applies to your business.

It gives suggestions on how to select insurace companies and counselors. It makes recommendations on how to insure and how to save on your insurance. It tells you what types of insurance are available for your protection and how to buy it.

It's interesting, and it's informative. Don't miss it!—NAII Ice News

Industrial Refrigeration

formerly **ICE AND REFRIGERATION**

Now in its 63rd Year of Publication

J. F. NICKERSON, FOUNDER

Vol. 128 **March, 1955** **Number 3**

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The Cover:

Tank used to precool sweet corn, 70 feet long and 20 feet wide; can cool 1,000 crates of corn from 85 to 41 F in one hour. Two 50-ton refrigerating units, provide refrigeration for chilling water. Crates of corn are loaded onto pallets, carried by conveyor into tank room, where they are placed at head of cooling tank on two parallel conveyors, six crates wide. Crates are 90 percent submerged in the icy water. Water from tank is picked up and sprayed over top to cool that portion of corn not submerged.

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LESS THAN 2 TEASPOONS

genetron 141—GREEN LABEL
MONOCHLORODIFLUOROMETHANE

Quality Specifications

Moisture wt. %, max.	0.0010
Chlorides	none
High boiling impurities—vol. %, max.	0.05
Non-condensable gases (gases insoluble in perchloroethylene)—vol. % in vapor phase, max.	5.0
Boiling pt. at 760 mm. Hg. °F.	—41.4
Boiling range °F (to 85% pt.), max.	0.9

genetron 12—WHITE LABEL
DICHLORODIFLUOROMETHANE

Quality Specifications

Moisture wt. %, max.	0.0010
Chlorides	none
High boiling impurities—vol. %, max.	0.05
Non-condensable gases (gases insoluble in perchloroethylene)—vol. % in vapor phase, max.	1.5
Boiling pt. at 760 mm. Hg. °F max.	—21.4
Boiling range °F (to 85% pt.), max.	0.5

genetron 11—ORANGE LABEL
TRICHLOROMONOFLUOROMETHANE

Quality Specifications

Moisture wt. %, max.	0.0015
Chlorides	none
High boiling impurities—vol. %, max.	0.05
Boiling point at 760 mm. Hg. °F.	74.7
Boiling range °F (to 85% pt.), max.	0.5

OF WATER IN ONE TON!

genetron®

Super-Dry Refrigerants

Two teaspoons of water aren't enough to cool your breakfast coffee or wet your whistle on a hot day . . . yet, that's the maximum amount of moisture ever found in a 2,000-lb. cylinder of "Genetron" Super-Dry Refrigerants. And, the amount in a single 145-lb. cylinder wouldn't even fog a man's glasses!

Actually, it takes the most delicate and accurate scientific apparatus to measure moisture in "Genetrons," for the content is so infinitely small that it must be expressed in parts per million.

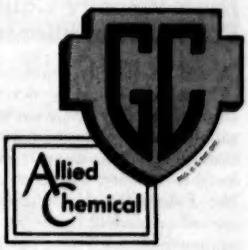
For example, "Genetron" 12—White Label—and "Genetron" 141—Green Label—are so dry they contain less than 10 parts of water per million parts of refrigerant. That's moisture equal to only one/thousandth of one per cent (0.001%).

And, the overall purity of "Genetron" Super-Dry Refrigerants is equally good, for they are manufactured to meet quality standards which are in many respects more rigid than those for the purest research chemicals.

Look at the stringent manufacturing specifications listed here. See how low "Genetrons" also are in non-condensable gases and low boiling impurities. And, remember that the quality of current production consistently surpasses even these specifications.

It's easy to see why so many leading manufacturers have now chosen "Genetron" Super-Dry Refrigerants as the original charge for their equipment. Their tests have proved "Genetrons" meet every requirement for reliable refrigerants.

So—be sure—always use "Genetron" Super-Dry Refrigerants—made by General Chemical, America's foremost producer of high purity laboratory and scientific chemicals.



Basic Chemicals for American Industry

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

Offices: Albany • Atlanta • Baltimore • Birmingham • Boston • Bridgeport • Buffalo • Charlotte • Chicago Cleveland • Denver • Detroit • Greenville (Miss.) • Houston • Jacksonville • Kalamazoo • Los Angeles Minneapolis • New York • Philadelphia • Pittsburgh • Providence • San Francisco • Seattle • St. Louis Yakima (Wash.) • In Wisconsin: General Chemical Company, Inc., Milwaukee

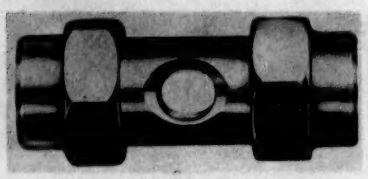
In Canada: The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

What's New

MACHINERY
APPLIANCES • PROCESSES

Liquid Eye Indicators in Iron Pipe Sizes

THE 5000 Series Liquid Eye Indicators are now offered by the Allin Manufacturing Co., Chicago, Ill. in ¾, 1 and 1-¼ inch iron pipe sizes. The Liquid Eye is constructed of steel, cadmiumplated to withstand moisture conditions without rusting. The 5000 Series is designed in



The Allin Liquid Eye Indicator

accordance with the Wittlin patent No. 2,624,308 using springs to force the neoprene gaskets in contact with the Pyrex glass and steel housing. Fluid pressure within the end fittings aid in sealing the gasket joint against leaks.

High safety factor is assured by the use of extra strength Pyrex glass. Each unit is tested to assure a perfect seal at the glass and at the end fittings screwed onto the housing. Periodic hydraulic tests are made up to 1000 p.s.i. to guarantee safety under the most extreme operating conditions. The 5000 Series Liquid Eye is suitable for use with any of the Freon refrigerants and with Ammonia. The housing and end fittings are designed to withstand piping stresses without distortion or damage to the unit.

The new 5000 Series in iron pipe sizes augments Allin's popular line of Liquid Eye Indicators made of brass in sizes from ⅛ inch through ½ inch iron pipe and ¼ inch through ⅝ inch in flare and sweat copper connections. Sweat copper connections are also available in the 5000 Series from ¾ inch through 1-⅛ inch and larger on special order.

High Velocity Converter For Air Conditioning

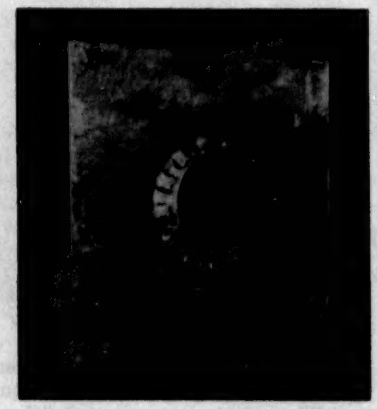
A HIGH velocity converter, which is an air flow adjusting device designed to regulate the flow of air out of high velocity supply ducts, thus permitting air conditioning at a low noise level and at comfortable velocity, has been introduced by The Pyle-National Company, manufacturers of electrical and air conditioning equipment.

This new converter, it is claimed, is completely new in concept, it regulates the flow of air out of high velocity supply ducts by reducing the static pressure in the vicinity of the outlet, through the principle of static pressure regain. It will make possible the air conditioning of a room, or area, off of a main, high velocity supply duct, without need for bulky acoustical treatment, heretofore associated with this type of air conditioning. It will be especially useful in a high velocity air conditioning set-up, such as large multistory office buildings, railway cars, hotels, hospitals, theatres, etc.

This new converter will perform in a manner somewhat analagous to that of a toy electric train transformer. Whereas an electric train transformer will reduce 110 volts to 6 volts, in order to avoid shock and fire, this new converter will "bleed off" into a room or area, from the main, high velocity air ducts, just enough air to effect the desired temperature, without disturbing the flow and pressure of high velocity air through the central ducts.

New Finned Cooling Coil

A FINNED cooling coil has been developed by Frick to meet the needs of larger cold storages, freezers and food processing plants. The fins are made of 14-gauge steel, split into leaves or tabs at the center, and spread as illustrated. After the fins have been placed in position, the forked leaves are forced together



Closeup of two fins on a short piece of pipe

under hydraulic pressure, until they make intimate contact with the parent metal of the pipe. The fins and pipe are further bonded with hot liquid galvanizing spelter, forming an efficient and permanent thermal contact. Laboratory trials show that this fin design excells in strength and thermal conductivity all others tested.

The Frick square fins are spaced on centers of 1 inch or 1½ inches, as desired by the user. Standard lengths for the pipes are 5 feet, 6 feet 8 inches, and 10 feet. With fins on 1-inch spacing, the total cooling surface is 8.1 square feet per foot of finned length. With 1½-inch spacing, the surface is 5.5 square feet per running foot of finned pipe. (Plain 2-inch pipe has 0.62 square feet of surface per lineal foot.)

The pipes are furnished with either plain or threaded ends. As the entire assembly is galvanized by the hot-dip method, it is necessary to thread both ends of the pipe and to seal them with caps, to keep the zinc from flowing inside; if plain ends are wanted, these threads are later cut off, making the pipe 2½ inches shorter in total length.

New Ice-Making Machines

TWO new large-capacity automatic ice-making machines designed to produce flake-ice in quantities of 1,000 pounds and 2,000 pounds a day are announced by Carrier Corporation. In addition, Carrier reports, it will begin production soon on a chip-ice machine with a capacity of 500 pounds a day.

The new Flakemaster machine for producing Flake Ice.

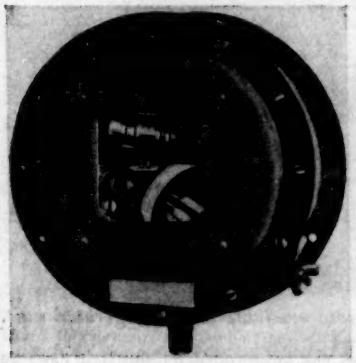
The new machines are being marketed under the trade name Carrier Flakemaster and Chipmaster. They will be available with either air-cooled or water-cooled refrigeration, continuing a trend toward elimination of water use established by Carrier with its residential air conditioned units.

The new Flakemasters are available with standard storage bins of 500 pounds capacity and either two or three access doors. The Chipmaster uses a bin of 250 pounds capacity. Custom-made bins for greater storage need can be made to order in a wide range of sizes.

In each of these automatic ice-making units, the ice is continuously manufactured until the bin is completely full, at which time the refrigerating system is automatically turned off. Sediment and other foreign matter are rejected as the ice is frozen, and these impurities are carried down the drain by flushing action.

New Weather Resistant Pressure Controls

A SERIES of weather resistant pressure controls has been designed by Mercoid Corp., Chicago, Ill., for outdoor use and are so constructed as to exclude a beating rain. They have many applications in such industries as food processors, dairies, bak-



New Mercoid pressure Control

eries and bottling works or wherever positive control of pressure is required. They conform to NEMA specifications by being semi-dust tight, drip tight, weather resistant, splashproof, sleet-proof and moisture resistant, and water tight.

The case is flanged and has a ¼ inch I.P.S. connection. The case and complementary parts are heavily zinc plated and provided with a special coating which will withstand a 50-hour salt spray test. The cover is neogrene, gasketed to the case and is vented to provide draining of condensation. Vent is shielded against water when subjected to beating rains. The gasketed glass port provides visual inspection of electrical contact operation and permits checking operating points on the visible calibrated dial. The external adjustments are also provided with a gasketed cover held in place by a simple wing nut.

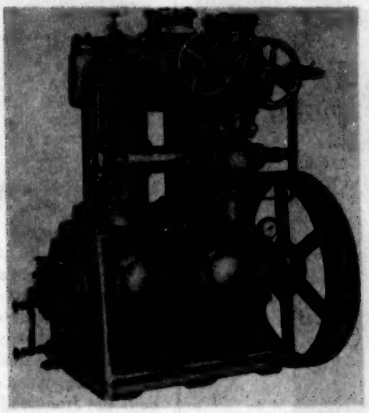
These controls are available in 17 operating ranges from 30-inch Vac. to 300-2500 psi with sensitivities from 2 oz to 20 psi, dependent upon range selected. Equipped with Mercoid sealed mercury contacts. Available to open or close an electrical circuit on an increase or decrease of pressure. Multiple circuit arrangements can be furnished to meet various needs.

Diesel Engines For Refrigeration Service

DEPENDABLE diesel engines that give steady production at decreased cost is the theme of a new booklet titled Low-Cost Power for Refrigeration published by Caterpillar Tractor Co., Peoria, Ill. This new booklet tells how Caterpillar Engines and Electric Sets cut power costs and increase profits. The brochure also discusses the need for protecting valuable frozen foods from the dangers of a power failure. Economical operation, long life, and dependable service and parts facilities are among other factors discussed.

Howe Booster Compressors

A COMPLETE line of ammonia booster compressors in both two and three cylinder models is now being offered to the industry by the Howe Ice Machine Company. Sizes as small as 5-ton and as large as 75-ton capacities, make it possible to secure just the size needed for any refrigeration system. Numerous outstanding features incorporated into the Howe Booster is the direct result of 43 years manufacturing experience in the ammonia compressor field.

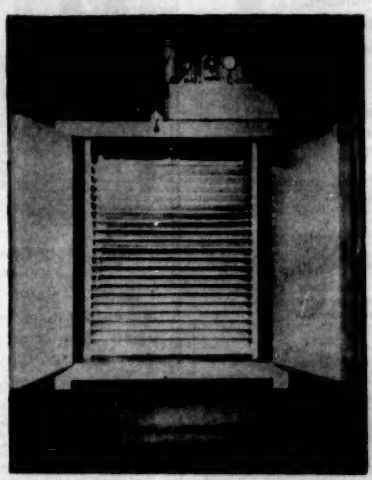


Howe 10-Ton Booster Compressor Model A24B

Howe features heavy duty construction, medium speeds; elimination of oil pumping, heating and valve breakage problems; crankshaft seal with lubricating oil under pressure, positively prevents air infiltration under all vacuum conditions; internal force feed lubrication to all bearings; compressor parts interchangeable with Howe standard units; and no automatic oil return is required.

New Contact Plate Freezer For Fish Products

A NEW model contact plate freezer, known as SR-20 made especially for freezing fish slabs, fish sticks and fish fillets is being featured by The American Plate Freezer Corp., Boston, Mass.



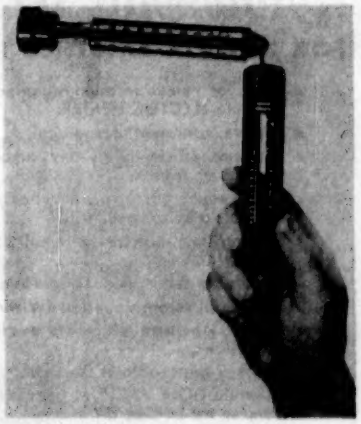
Model SR 20 stations contact plate freezer made by American Plate Freezer Corp.

It is equipped with a double acting hydraulic ram with 4-way fingertip valve controls position of plates up or down. After loading, the plates are lowered making positive contact with top and bottom of packages, thus applying a uniform pressure and freezing rate to product. Freezing starts immediately. After freezing is complete, plates are raised by hydraulic ram. Uniformly frozen perfect packages are then removed.

The overall dimensions are 6 ft. 8 in. wide, 5 ft. 8 in. deep, 7 ft. 6 in. high plus 3 ft. 2 in. for hydraulic ram. There are 20 freezing stations each 56 in. wide by 43 in. deep clear surface area, adjustable 1 in. to 2¼ in. between plates. Approximate freezing time is one inch of pack thickness per hour. Additional models made to customers requirements for fish fillets, shrimp, scallops, meats, hamburgers, steak, poultry, vegetables, fruits, pies, canned soups.

New Psychrometer For Field Service

A PSYCHROMETER specifically designed for field service application has been developed by the Bacharach Industrial Instrument Company, Pittsburgh, Pa. This instrument measures percent relative humidity by wet and dry bulb thermometer readings. Its two thermometers are mounted in a plastic case which telescopes into a plastic handle-holder. The wick of the wet-bulb thermometer leads into a water reservoir at the end of the thermometer case.



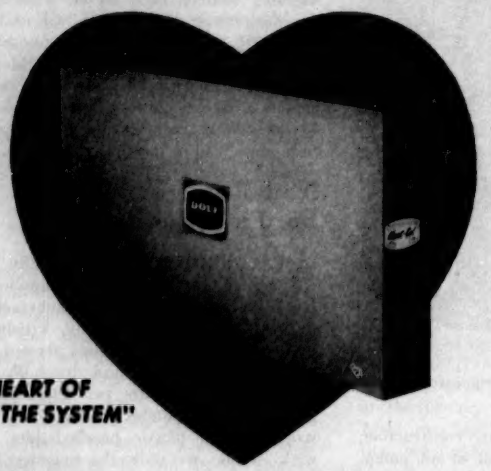
New Bacharach Psychrometer

Thermometer case and holder are connected by means of a unique swivel assembly which makes possible whirling the thermometers freely with the handle held upright.

Another of the instrument's unique features is its built-in slide rule calculator that correlates wet and dry bulb thermometer readings to show percent relative humidity at a glance. The calculator is expanded into two sections: 30 to 70°F on one side of instrument, 50 to 100°F on the opposite side. The two scale sections, combined, are 7 inches long, and the scale can be read to 1 percent relative humidity over the entire range.

DEFROST PROBLEMS?
Here's the ANSWER!...

ELECTRIC
Heat-Cel



"HEART OF THE SYSTEM"

Automatic DEFROST
FOR NEW OR EXISTING INSTALLATIONS

- Heat for re-evaporation supplied by low wattage, long life ELECTRIC HEATER.
- Positive, consistent, economical.
- Performs efficiently in any ambient, regardless of location or season.
- Independent of compressor operating time or type (air or water cooled).
- Solution temperature automatically maintained by thermostat.
- Adjustable for individual operating conditions.
- No special controls needed for winter-time operation.
- Higher wattage elements available for extreme conditions.
- Heater replaceable in the field.
- Patented DOLE VACUUM principle insures faster heat transfer for quicker defrosting . . . convenient "plate" design allows flat-against-wall mounting.

Write for Engineering Catalog DE.

Defrosting "Kit" includes Heat-Cel and Accessory Package containing all necessary controls*

* Approved by Underwriters Laboratories

Maximum Refrigeration Efficiency
DOLE
THE Oil LINE

DOLE REFRIGERATING COMPANY

Refrigerated Reefer

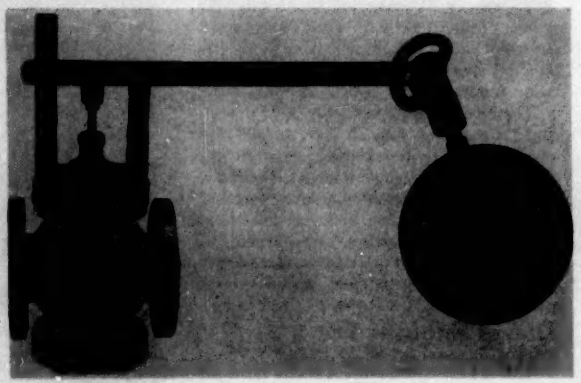
THE Volume Van recently announced by the Fruehauf Trailer Company, and designed to give maximum capacity for any given length and weight is now available as a refrigerated unit. Following the pattern of its dry-freight predecessor, the new unit is designed to give larger reefer loads and more insulated space per unit of length and height.

New Volume Van now available as a refrigerated unit.

Any desired insulation can be provided for this unit down as low as minus 10 F. Insulation comes in three thicknesses, the lightest being three inches for 35 F or above; 4-½-inch thickness for 10 F or above; and six inches for minus 10 F. Feature of the Volume Van reefer is a sturdy light-weight, moisture proof floor of overlapping extruded aluminum sections. Drainage is provided at both the front and rear ends. Helping maintain desired temperatures is the sure-seal precision-built reefer door with triple-seal plastic gaskets and positive-action latch. The smooth-side Volume Van reefers are available both as straight and drop frame units. Both types have flat floors but the drop frame model offers, at slight additional cost, increased inside room without increasing height.

New Float Valve For Liquid Levels

A NEW float type valve for controlling levels of liquids in many industrial operations has been added to the line of industrial control devices manufactured by Fulton Sylphon Division of Robertshaw-Fulton Controls Company, Knoxville, Tenn.



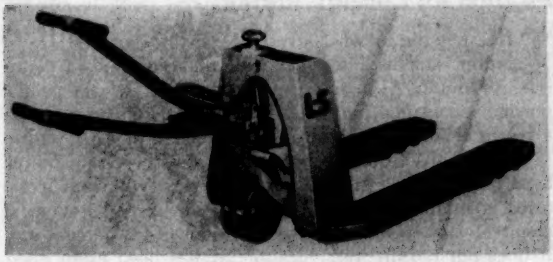
New Float Type Valve For Liquid Levels

Application for the float valve may be found in air conditioning installations, power plants, textile mills, water works, packing plants, breweries, chemical plants and many other industries. They are used to maintain the level in open storage tanks, process tanks, spray ponds, cooling tower basins and similar liquid reservoirs.

Designed to require a minimum of maintenance, the new control can be ordered in eleven different valve sizes, from ¼ to 4 inches. Larger sizes are supplied with a semi-balanced, double-seated valve. This valve, it was stated, is preferred for many uses, particularly for slurries or liquids containing suspended solids.

Light Pallet Truck Has Safety Brake

FOR operations where a hydraulic pallet truck must be used on grades, this lightweight truck from Lewis-Shepard Products, Inc., offers a unique safety brake which operates on the front wheels of the truck, not on the floor.



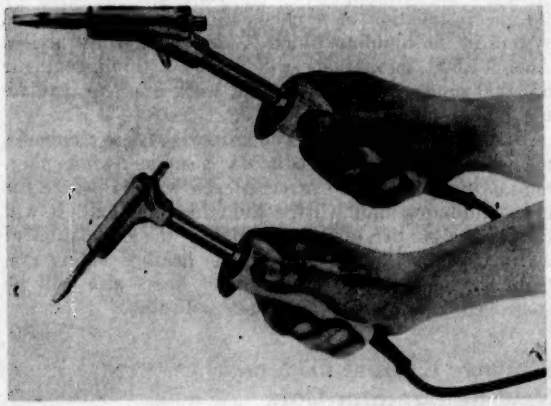
Lightweight Pallet Truck With Safety Brake

The brake itself consists of a lined shoe on the front wheels operated through the position of the pull handle. When the handle is in the vertical or "pulling" position, the brake is released. When the handle is in the horizontal position, the brake is applied. To apply the brake on grades the operator simply lowers the handle. The brake in no way interferes with the normal operation of the truck and will not damage floors.

Weighing only 250 lbs., the truck will carry 2000 lb. loads with a minimum of dead weight. Ball bearings in both front and rear wheels make it the easiest pulling truck on the market. There are no grease points; sealed bearings or self-lubricating bronze bushings are used throughout. This model is for use with single face pallets, double face pallets and skid platforms.

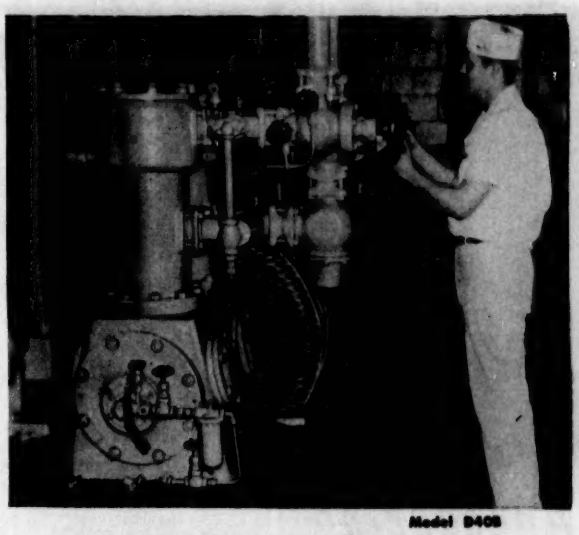
Soldering Tools Available To Industrial Users

ZEVA electric soldering tools are now being sold direct to industrial users at a competitive price. With 16 different styles, covering a range of 30 to 800 watts, there is a ZEVA iron for every industrial application, according to the makers, Paul C. Roche Co., New York.



Zeva Industrial soldering irons

The outstanding advantage of these tools, it is said, is the permanent, built-in heating element, hermetically sealed in cast aluminum, guaranteed to last as long as the tool itself. The inner surface of the element housing is heat proof and non-corrodible. It has specially designed internal ribs for maximum heat radiation to the soldering tip. The replaceable solid copper tip is adjustable by means of an eccentric lever. This adjustment allows the iron to be set at the exact temperature required for greatest soldering efficiency. The complete assembly is light, well balanced, and less fatiguing, because of its thoroughly engineered design.



Model B40B

Boost Plant Efficiency

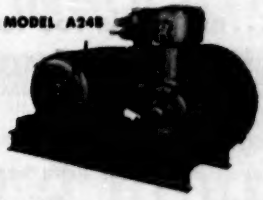
WITH HOWE AMMONIA

BOOSTER COMPRESSORS

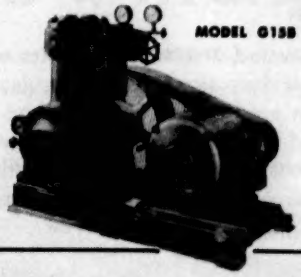
Add Howe Ammonia Booster Compressor to your present plant to efficiently handle your quick freezer or freezer storage load. Howe Boosters mean lower first cost and lower operating costs. *It sure pays to Know Howe!*

A size and type for every application.

MODEL A24B



MODEL G15B



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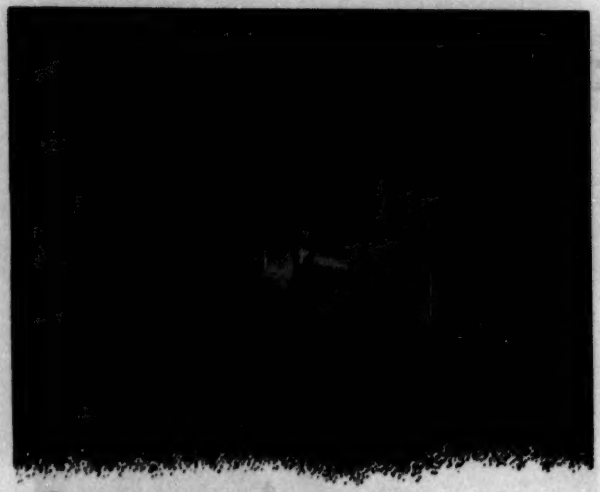
SINCE 1913, manufacturers of ammonia compressors, condensers, coolers, fin coils, locker freezing units, air conditioning (cooling) equipment. Immediate delivery!



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Capacity...

THERMOBANK

for Freon and Ammonia

NOW...no job is too large for the KRAMER THERMOBANK

The only completely automatic system for freezing temperatures offering these extra large capacities. THERMOBANK requires no manual attention whatsoever.

Ceiling mounted, THERMOBANK takes no precious floor space. You can store products directly under the unit.

Can be used as an independent system or with an existing large system without affecting the operation of other evaporators.

WRITE FOR BULLETIN TA249-F

KRAMER TRENTON CO.
Trenton 5, N.J.

PRESS BRIEFS

Butter Converted Into Ghee May Offer Product for Foreign Market

THE possibility of converting portions of the U. S. butter surplus into ghee and marketing it in countries of South Asia and the Middle East whose people normally consume butter-fat in that form is discussed in a recent report from the U. S. Department of Agriculture.

Ghee results from the removal of moisture from butter by a boiling process. It is comparatively free from moisture, is light in color, has a granular consistency as a result of slow cooling and contains over 99 percent fat. It does not require refrigeration. It has been established that a demand exists for this product that is greater than the supply being produced in consuming countries and a supplemental supply from outside these countries is desirable. Both current and long range, but especially long range, marketing possibilities are under study. USDA has been working with the dairy industry in investigating the market for ghee and in encouraging the industry to perfect methods of producing an American ghee acceptable to foreign buyers.

It is believed acceptable methods will be worked out in time. Ghee is not to be confused with butter oil. During the past six months the United States has sent abroad, mostly to Pakistan, about 45 million lbs. of butter in the form of about 34 million lbs. of butter oil, packed in 55-gallon drums. It differs from ghee in color, texture, and flavor.

Office Building Installs Air Conditioning

TENANTS of the forty-two-story air conditioned Socony-Vacuum Oil Company Building at 150 East Forty-second Street, New York, will have individual control over their office temperatures. A contract has been awarded the Minneapolis-Honeywell Regulator Company for the installation of a pneumatic thermostatic control system in the building which is now under construction. About 1,800 thermostats will be used throughout the 553,600 square feet of office and work areas to regulate the indoor climate.

Designed by Carrier, the conduit-style system eliminates the need for conventional radiators. A summer-winter thermostat will be installed beneath each window where the air-conditioning unit will be built into the wall. It will control the temperature by regulating the circulation of warm or chilled water through the heating-cooling system. The temperature of the inner areas also will be controlled independently and automatically.

Railway Express Orders New Refrigerator Cars

THE Railway Express has placed an order for 300 new 50-ton high-speed refrigerator railroad cars to cost more than $6,000,000, according to an announcement by A. L. Hammell, president. The new cars will be manufactured by the General American Transportation corporation in East Chicago, Ill. and delivery is expected to begin in the second quarter of this year. They will be used for handling fresh fruits, vegetables, seafoods and other perishables. The company announced last September that it had placed an order for $9,500,000 in new pick-up and delivery trucks.

Refrigeration and the Year 1955

THE most apparently sound prediction for the year 1955 is that frozen foods will make great gains. As everyone is aware, they made great gains in 1954. The most numerous news events of the year were the reports of plant remodeling and expansion, or new construction—based on frozen foods. Obviously, too, our refrigeration industries develop directly from sound science and engineering, and from sound economics. They are delivering quality at reasonable cost.

Students of our industrial history frequently point out that our success is based on continuous development and expansion. It is expected that our USA national product will soon reach the annual level of 500 billion dollars and that our rate of acceleration will carry us to a second 500 billion within the lives of a single generation. Those predictions are based on assumptions, a major one being the continuation of advanced research, advanced planning and strong intelligent leadership. Certainly, the future refrigeration looms large, provided we keep pace—TRRF Information Bulletin.

Frozen Fish for Mink Farms

AT THE 1955 International Mink Show, held in Milwaukee, many of the exhibits included frozen foods for mink. Among the prominent exhibits was that of George L. Berghammer, distributor of such food, located in Milwaukee, with country-wide distribution. He has been in this business for about 20 years, and takes the output of frozen fish of several commercial fishing companies, the fish being frozen at point of production, on the Atlantic Coast and from the Great Lakes. Fish are frozen only where boats can tie up right at the freezer. No fish are trucked over any highway to the freezer. This, said Berghammer, insures good quality at all times. The fish are mostly Whiting and lake herring.

The frozen product is trucked to the ranch farms in ton lots, packed in 50 pound cartons, after being frozen at about 0 F. Fish are never kept in storage in Milwaukee, the demand making that unnecessary. In the course of a year more than five million pounds of frozen fish are shipped to customers, who are requested to keep them at zero to 5 F.

Russians Announce New Cold Storage

AN announcement was made some months ago of a new refrigerated warehouse to be built in Moscow's Cherkizov District, claimed to be the largest cold storage plant in Europe. It will have a capacity of 18,000 tons

New cold storage plant to be built in Cherkizov District of Moscow

initially and up to 35,000 tons when completed. American architects and builders will be interested in the gingerbread trim shown in the above picture.

GENUINE
OZITE
PIPE
COVERING
INSULATION

lasts a lifetime

Ozite is practically indestructible because it is made entirely of nature's most perfect insulant —hair. It applies easily and without waste . . . renders low conductivity for efficient heat barrier . . . allows close temperature control . . . cuts power consumption.

Write for Bulletin No. 300

NO SHAPE IS TOO COMPLEX

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SPEEDY
REFRIGERATION SERVICE
WITH ALCO T SERIES THERMO VALVES
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SERVICING
TO SPECIFY
ENGINEERED FOR SERVICE...FOR LIFE
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SEE YOUR ALCO WHOLESALER

In the Spotlight

AIR COOLED Condensers have not been fully accepted because of lack of information about their performance. But tests and experiences have shown that they can be depended upon to produce economical results, according to the author of the article starting on page 15. The article gives facts and figures to support the above decision.

AIR CONDITIONING of Navy combat vessels is essential because of the tremendous heat generated by the machinery throughout the ship and the all-steel flight deck. A description of the equipment installed for that purpose is given in the article on page 20.

STORAGE CAPACITY of refrigerated warehouses in the United States had a gain of 37,034,000 gross cubic feet from 1951 to a total of 748,050,000 cubic feet in 1953. Public warehouses account for almost three-fifths of the national refrigerated gross capacity, of which considerably more than half is in the freezer range. These and other facts are included in report from the United States Department of Agriculture, summarized in the article starting on page 21.

RESEARCH and technical problems related to refrigerated warehousing were reviewed at the annual meeting of the Scientific Advisory Council TRRF. Recommendations for future work included work on packaging, better fishery products, handling frozen foods, control of humidity and temperature, frost heaving of floors, respiration of fruits and vegetables, condensation and freezing baked goods. See report of meeting on page 27.

A HEAT PUMP has been developed by the Canadian Defense Research Board to conserve fuel in arctic locations. New controls are being developed to safeguard equipment. For description of the device, see article starting on page 28.

HOW TO make ice distribution pay was the subject of a paper at the Annual Ice Convention at Cincinnati. This company did it by making an accurate study of delivery costs and the market, and then adjusting the selling price to the overall cost. The author comes up with some answers that will surprise many ice distributors. See page 30.

PRACTICAL refrigeration engineer for one of the nation's leading dairy firms, briefs younger members of NAPRE at San Francisco, in "New Engineers Learn Dairy Refrigeration Uses", page 31. Frank Cordoza, the author, was among the first active members of that chapter to assist in a new program of information on industry refrigeration applications. Short historical background and major developments are cited.

AN OWNER believes his liquid solenoid valves to be too delicate for their application, but concedes fact that dirt, gasket trouble and oil in system may be contributory. Experienced valve man points out a few items that may be the real causes, in answer 1041, Question Box, Page 44.

FROZEN FISH STICKS will reach 50 million pounds for 1954, compared with 7.5 million in 1953, according to U.S. Fish and Wildlife Service.

AN AUSTRALIAN engineer in the early fall of 1953 toured the United States and England and set himself the task of observing post war advances in industrial refrigeration. The high lights of these observations were set forth in a talk to the American Institute of Refrigeration, copy of which appears in the article on page 49.

A NEW ADDITION to petrochemicals, known as Paraxylene is being produced in a new plant near Big Spring, Texas. A description of the new chemical and its manufacturing process is included in article on page 58.

A SEMINAR on products, services offered, and solutions to packer engineering and insulation problems was held in Chicago with members of the American Meat Institute and ASRE Joint Engineering Committee, guests of Owens Corning Fiberglas Corp. For report of the meeting see page 59.

IN THE LIFE cycle of business, the air conditioning industry is in its infancy — at least hardly in its teens — with years of vigorous growth before it even reaches middle age. Here, we believe, are the three principal factors working for its future: The impressive size of the market; The readiness — even the eagerness — of the American public to enjoy air conditioning everywhere; The steady reduction in price, along with improvement in quality — Donald C. Minard, president of The Trane Company.

MORE and more of the fruits and vegetables purchased by consumers are canned or frozen. In 1910-1919, 6 pounds of canned fruits and juices were purchased for every 100 pounds of fresh; in 1950, 33 pounds of canned fruits and juices, plus 4 pounds of frozen, were purchased for every 100 pounds of fresh, reports the Twentieth Century Fund.

FOAMGLAS®

the cellular, stay-dry insulation

Underground quarry's 2,500-carload freezers stay dry because FOAMGLAS is moisture-proof

In a nine-acre *underground* limestone quarry below a 175 ft. overburden, Inland Cold Storage Company, Kansas City, Kansas, can store 2,500 carloads of frozen foods! "Our cave was a natural for this," Inland President Leonard H. Strauss points out. "A year-round temperature of 55°F cut in half our costs for refrigeration and construction. With naturally insulated ceilings and floors, only walls were needed to complete our 16 storage rooms.

"We had one tough problem. Although this is a 'dry cave,' on a hot, humid day the relative humidity inside the undeveloped area may reach 85%. But this moist air won't get into any of our freezers or coolers because their walls are insulated with moisture-proof FOAMGLAS. It's the one insulation that'll stay constantly efficient, making refrigeration failure a minor problem. We'd lose only two or three degrees in our zero degree rooms with a complete refrigeration breakdown for two weeks."

You can benefit too from the unique properties of this waterproof, strong, vermin-proof insulation. Please write today for our booklets with complete technical and specification data for cold storage insulation.

Pittsburgh Corning Corporation

Department T-35, One Gateway Center
Pittsburgh 22, Pennsylvania

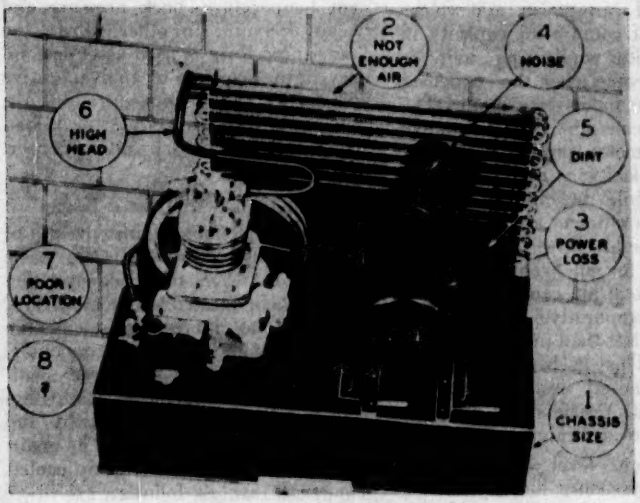
In Canada: 57 Bloor St. W., Toronto, Ontario

450,000 bd. ft. of FOAMGLAS was very easy to install... five inches thick on walls between the rooms and six inches, double coursed on perimeter walls. 15,000 ft. of FOAMGLAS pipe insulation was applied later to brine lines held at 24° below zero. General Contractor was Winn-Senter Construction Co., Kansas City, Mo.; Insulation Contractor was Kelly Asbestos Products Co., Kansas City, Mo.

Air Cooled Condensers For Large Tonnages

Acceptance of these condensers has been delayed from lack of information about their performance. But tests and experience have shown that they can produce economical results.

OTTO J. NUSSBAUM
Chief Engineer
Kramer-Trenton Co.
Trenton, N. J.



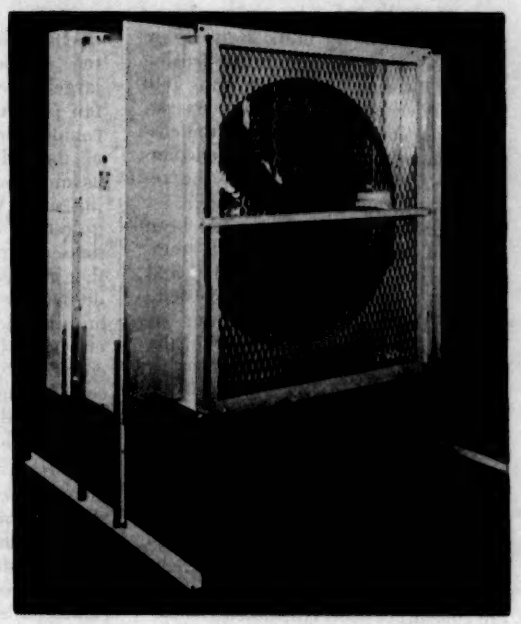


Fig. 1 (Above) A factory made condensing unit with air cooled condenser mounted on chassis. Fig. 2 (Right) In this condenser a separate fan and motor has been added to condensing coil and removed from the compressor chassis.

UNTIL very recently, the air cooled condenser was relegated to a position of comparative obscurity among the tools available to the designer of medium and large tonnage refrigeration systems. It has found little mention in published literature in spite of the fact that its existence and advantages were invariably recognized in numerous papers written on condensing of refrigerants.

Used for Some Small Units

It is well established that the air cooled condenser has found wide acceptance in applications such as domestic refrigerators, freezers and room air conditioners; in store fixtures, vehicle refrigeration and in the majority of condensing units of fractional horsepower size. In all these applications, automaticity is essential. It is for this reason that the air cooled condenser has established itself as a satisfactory choice, because of its simplicity and complete freedom from the many problems encountered in wet condensing.

The use of air cooled condensers in units larger than three horsepower, was delayed mainly because of tradition; i.e., based on certain unfavorable experiences with the factory assembled condensing unit (Fig. 1) with the air cooled condenser mounted on unit chassis. These experiences had a tendency to mislead the judgment of the refrigerating engineer. Examine some of his reasoning:

Unfavorable Factors

1. Dimensional Considerations — Volumetric limitations made air cooled condensing units undesirable for capacities above three horsepower, because the condenser was mounted to the base of the condensing unit and its size was therefore limited to the maximum dimensions of a practical compressor chassis.

2. Poor Air Distribution — With the condenser fan usually mounted on the compressor motor shaft at one end of the condenser, it was difficult to get uniform air distribution through the condenser. The air quantity available to the condenser was based less on efficient heat transfer and more on power economy. Often half of the condenser was practically inactive because of insufficient air velocity.

3. Reduced Compressor Capacity — In the air cooled condensing unit of the open type, the power to drive the fan is taken from the compressor motor. As more fan power is used, less motor power remains to drive the compressor; the compressor speed must therefore be reduced to prevent motor overloading. This results in reduced refrigeration capacity for air cooled condensing units of the open, chassis mounted type.

4. Noise — Since the fan was directly connected to the compressor motor, it operated at a very high speed (1750 rpm). This resulted in an objectionably high noise level, especially with two and three horsepower units.

5. Dirt Accumulation — Most of

the condensing units are located near the floor. The air stream entering the condenser constantly sweeps the floor and quickly clogs the chassis mounted condenser with dust. Frequently it was necessary to install the compressor in a cramped, unventilated and dirty location, thus subjecting the chassis mounted air-cooled condenser to the utmost disadvantage.

6. High Head Pressure — Due to the competitive economies required in the design of an air-cooled condensing unit, the refrigeration industry has become accustomed to comparatively high head pressures in air cooled condensing units. Ratings are usually based on 120 F condensing temperature at 90 F air entering into the condenser. Under actual operating conditions, much higher condensing temperatures were often encountered which further reduced the refrigerating capacity of the system.

7. No Research — There has been constant research and much published on most components and phases of the refrigeration system, except the air-cooled condenser. It has literally been the "orphan" of the refrigeration industry.

Objections Not Valid

These considerations and practical experiences, could not fail but create an impression that air-cooled condensers were unfit for compressors larger than three horsepower. However, the arguments seem to lose their validity when applied to an integral air cooled condenser installed remote from the compressor.

It has now become evident that most of the obpections to the conventional air cooled condensing unit were due to the fact that the condenser was mounted on the compressor chassis. These objections can be effectively overcome by adding a separate fan and motor to the condensing coil, and by removing it from the conventional chassis. This permits a condenser design which is entirely uninfluenced by the dimensional and competitive considerations motivating the compressor manufacturer. It permits construction calculated to yield the highest possible rate of heat transfer consistent with good economy and good operating characteristics (Fig. 2).

Favorable Factors

Reexamine the previous arguments in the light of the remote integral air cooled unit condenser.

1. Dimensions cease to be a controlling factor, once the air cooled condenser size is no longer dictated by the size of the compressor chassis; as is also the case with an evaporative condenser or cooling tower. The floor area required for a remote air cooled condenser is no greater than for a floor mounted evaporative condenser; or if wall mounted, its space requirements are of little or no consequence.

2. A unit condenser is easily designed for uniform air distribution through the coils; for the most practical air quantity from the viewpoint of heat transfer. This eliminates the most severe limitation imposed on the chassis mounted air cooled condenser.

3. Use of fan power and consequent loss of compressor capacity in the composite condensing unit, is largely overcome when the condenser fan is driven by its own motor. The compressor can now take advantage of its full motor power, producing as much capacity as a wet condensing unit. While the cfm per ton required by an efficient air cooled condenser is roughly three to four times that needed for an evaporative condenser, the total hp. consumption per ton in an evaporative condenser is only slightly less than in an air cooled condenser. This is because an air cooled condenser needs no pump motor, and its resistance to air flow can be held to a minimum.

4. High noise level of the chassis mounted condensing units can be traced to narrow bladed fans of large diameter mounted on the compressor motor shaft. In the unit condenser the fan noise can be reduced to a comfortable level by using wide fan blades operated at low peripheral speeds.

5. Disadvantages of poor ventilation, cramped location and dirt accumulation can be fully corrected by the unit condenser which away from the compressor; and, its location can be selected either indoors or outdoors so as to provide an ample supply of relatively cool, clean air. In fact, the fan of a remote unit condenser can be utilized to help ventilate an otherwise hot compressor room. The condenser can now be mounted well above the floor so that the air stream entering the coil will be relatively dust free.

6. High head pressure of condensing units was due to a trade standard originated years ago, which was based primarily on the competitive design economy of a chassis mounted condenser. This standard dictated a condenser having surface of 95 to 110 square feet per compressor hp. Standard condenser surface consisted of $\frac{3}{8}$ inch tubes on 1 inch centers. For the sake of production economy it was customary to use one and the same condenser for a wide range of operating conditions. As a result, the standard head pressures obtained in the "Freon-12" air-cooled condensing units at 90 F ambient were roughly as follows:

Back Pressure	Head Pressure
10 psi	138 psi
20 psi	152 psi
30 psi	166 psi

When an air-cooled condenser becomes a unit condenser, installed remote from the compressor, it can be selected for each individual application, based on the anticipated ambient temperature, back pressure and head pressure. In other words, the same procedure is used as is customary in the selection of an evaporative condenser. This procedure insures full compressor capacity at peak load conditions using a dry unit condenser.

General Advantages

Since objections against the use of an air cooled condenser seem to be minimized when the condenser becomes an integrated and remote unit, it should be interesting to examine the advantages of such a condenser, particularly when compared with other types of remote condensers which have been accepted by the industry for many years. The main advantages of the remote air cooled condenser are as follows:

1. The air cooled condenser requires no water; therefore, the danger of scaling, corrosion and winter freeze-ups does not exist.

2. There is no necessity for plumbing. This eliminates a considerable portion of the first cost of installation.

3. Maintenance cost is low because of the simplicity and foolproof nature of the air cooled condenser.

4. The important problems of water restrictions and sewage limitations are solved as they are not used by the air cooled condenser.

5. The problem of fire hazards which is present particularly in large tonnage cooling towers, is avoided by the air cooled condenser. Such cooling towers are either partially or entirely constructed of wood and therefore are vulnerable to this risk.

6. The control of head pressure during the winter has been fully and inexpensively provided for by the Winterstat — a very simple control.

7. Both first cost and the operating cost of an air cooled condenser compare favorably with other types of condensers.

The unit condenser in its present stage of development is the result of 14 years of laboratory work and field experience accumulated in numerous installations, under all types of oper-

ating conditions ranging from sub-zero weather to subtropical climates.

Air Condenser Economics

Cost of a unit condenser can be broken down into three components; namely, initial cost, installation cost and cost of operation.

First cost of a system employing a unit condenser is lower than that of an evaporative cooled system, or a cooling tower system operating at approximately the same head pressure. Comparing published list prices, a 3-ton unit condenser alone has an initial cost approximately 12 percent lower than a 3-ton evaporative condenser. The same comparison would hold true when comparing two separate 1-ton unit condensers with a single 2-circuit 2-ton evaporative condenser. The initial cost advantage in favor of the dry unit condenser diminishes as the capacity increases. At the 30-ton level and higher, it is approximately equal in first cost to evaporative cooled systems.

Installation of Air-cooled unit condensers is comparatively simple. Unlike an evaporative cooled or water cooled system, piping is limited to the refrigerant. Since plumbing work is expensive and must usually be performed by a licensed specialist, the installation cost of wet condensers will normally be higher than that of a dry unit condenser.

From the viewpoint of operating cost there is a definite advantage in favor of the dry unit condenser. Table 1 shows a comparison of operating costs per 1000 ton-hours for compressors with various types of condensers, based on water requirements and power consumption. The lowest cost of operation is obtained with a unit condenser at high air delivery.

A major factor in operating cost is maintenance and service, which has not been accounted for in Table 1. This item is often forgotten when selecting new equipment. Wet type condensers are vulnerable to corrosion and scaling. They require continual and careful servicing. It is natural to expect shorter life spans in a wet condensing system compared to a dry one. Since the unit condenser is practically service-free, its operating cost advantages can hardly be questioned.

Selection and Ratings

Selection of an air-cooled unit condenser is made in the same manner as is customary for evaporative condensers, except that the wet bulb temperature of the air is not considered and the dry bulb temperature is the determining factor.

TABLE 1 — COMPARISON OF CONDENSER OPERATING COSTS FOR A 20 TON SYSTEM

	Water Cooled Condenser	Cooling Tower	Evaporative Condenser	Unicon High Air Delivery	Unicon Low Air Delivery
Water Temp. °F	75°	—	—	—	—
Average Outside Temp.	—	75°WB	75°WB	90°DB	90°DB
Tons	20.5	20.2	20.3	19.5	18.33
Condensing Temp. °F	102	103.8	103.5	107.2	118.0
Compressor Watts/Ton-hr.	761	784	775	820	955
Fan Watts/Ton-hr.	—	74	49	101	55
Pump Watts/Ton-hr.	—	99	12	—	—
Total Watts/Ton-hr.	761	957	836	921	1010
BTU Cooling/Watt	15.78	12.53	14.35	13.06	11.88
Make-up Water lb/Ton-hr.	750	28.7	27.5	—	—
BTU Cooling/lb. Water	16	417	436	—	—
Operating Cost per 1000 Ton-hr.:					
Electricity: at 2c per KWH	$15.22	$19.14	$16.72	$18.42	$20.20
Water: at 30c per 1000 Gal.	$27.00	$ 1.04	$ 0.99	—	—
Water Treatment: at $2 per 1000 Ton-hr.	—	$ 2.00	$ 2.00	—	—
Total Cost per 1000 Ton-hr.	$42.22	$22.18	$19.71	$18.42	$20.20

In the calculation of the tabulated figures, water rates and power rates were based on 1954 tariffs in Trenton, New Jersey; compressor capacities, power and water consumptions were based on published catalog information.

Rating of an air-cooled condenser has never been standardized by the refrigeration industry, because it had traditionally been considered an integral part of the small compressor condensing system. Since the unit condenser is selected independent of the compressor, it was necessary that each unit be tested and rated under actual operating conditions.

In general, the *capacity of the unit condenser is directly proportional to the temperature difference between the dry bulb temperature of the air entering the coil and the condensing temperature.* Standard ratings were accurately established on the basis of 90 F air, 120 F condensing, and 40 F evaporating temperatures. To simplify selection, correction factors were established to obtain ratings at conditions other than standard.

Precise selections are possible using the graphic method shown in Fig. 3. Graph makes it possible to predict the condensing temperature, btu capacity and kw input of the compressor at given ambient air temperatures.

For commercial purposes, this degree of accuracy is seldom required. Recently there has been made available very complete data which facilitate the selection of unit condensers. Any intelligent layman can make full use of it without engineering assistance.

Controls

Control of head pressure in air-cooled unit condensers presented a very unique problem because their condensing capacity is highly sensitive to ambient air temperature. This problem did not exist in the same measure in chassis mounted air-cooled condensing units because such units are generally installed in locations where the air temperature remains substantially unchanged, regardless of the time of the day or season.

Remote unit condensers, on the other hand, are usually installed outdoors where they are subjected to sharp air temperature changes during an operating day and from season to season. Since unit condensers are selected to maintain a satisfactory head pressure when the ambient temperature reaches a maximum, the problem of control is reduced to maintaining a sufficiently high and uniform head pressure when the air temperature drops below the design maximum.

A solution to this problem which proved unsatisfactory, is shown in Fig. 4. Operation of the fan motor on the unit condenser was governed

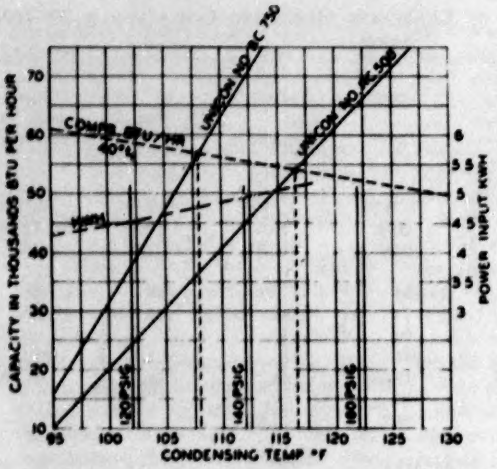


Fig. 3 — Graphic method of predicting condensing temperature, Btu capacity, and Kw input of compressor motor at given ambient temperature of 90F.

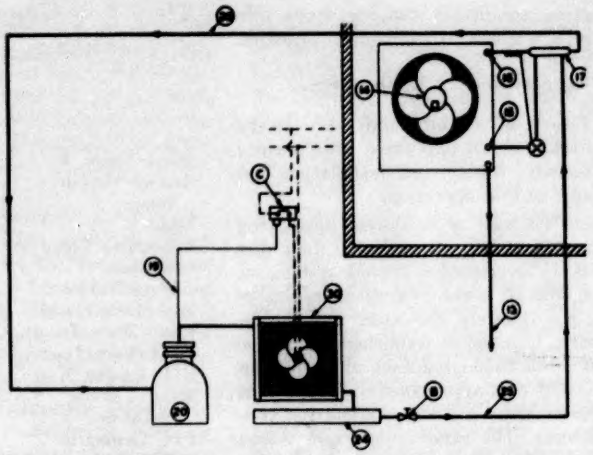


Fig. 4 — Diagram of "Unicon" with head pressure control using suction pressure switch to make and break contact on rise and drop in head pressure.

by a high pressure cut-in switch which makes and breaks contact on rise and drop in head pressure. With this type control, air delivery through the condenser coil stops whenever the head pressure drops below the switch setting, and vice versa.

The inadequacy of this method is explained by the fact that the capacity of the condensing coil is reduced to one-seventh of its original capacity when air delivery is stopped. Therefore, immediately upon stopping of the fan the head pressure rose sharply, causing the control switch to make contact after a very short off-period. This resulted in very frequent cycling of the fan motor. Even with a switch differential setting as high as 40 psi, from 40 to 60 cycles per hour were not uncommon, depending on the air temperature. Consequently, the head pressure was subject to fluctuations of high amplitude and frequency shortening the life of the fan motor starting mechanism.

It became obvious that better control would be possible if the air quantity through the condenser were modulated, rather than cut off entirely at low head pressures. This objective could be accomplished with a rather expensive fan motor of the permanent split capacitor type and a pressure switch of a modulating character in conjunction with a motor speed controller.

Modulation of the air delivery could also be approached by using a multiplicity of fan motors (Fig. 5) controlled by individual pressure switches, the settings of which are arranged in sequence. However, all of these methods were proven unreliable for the reason that low head pressures due to high wind velocities through the condensing coil cannot be prevented, even if all fans are off.

Air-cooled condenser control methods thus far discussed correspond essentially to those customarily used in wet condensers; i.e., control of the quantity of cooling fluid. In wet condensers, these methods are satisfactory only to the degree in which they lend themselves to modulation of the coolant quantity; as for instance, in a water cooled condenser with water modulating valve.

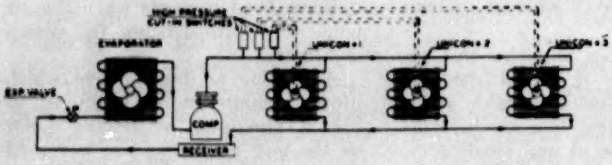
For use with the air-cooled unit condenser, a method has been developed which introduces an entirely new concept of condenser capacity control. Instead of controlling the quantity of coolant flowing through the condenser, the amount of effective condenser surface is modulated by partially filling the condenser with liquid refrigerant (Fig. 6).

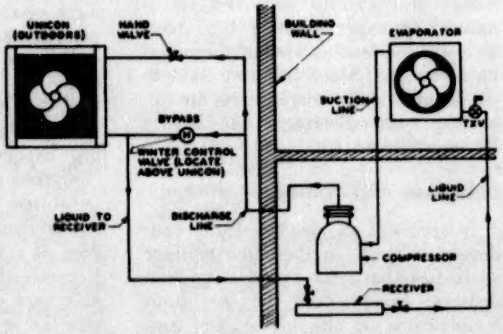
In this patented method, the amount of flooding of the unit condenser can be very closely controlled. This results in practically constant head pressures, regardless of the ambient air temperature and regardless of the air quantity flowing through the condenser. This control essentially consists of a pressure actuated throttling valve, installed in a bypass line which connects the condenser inlet with the receiver inlet. The throttling valve (H) is actuated by the condensing pressure at its outlet and opens on a drop in pressure.

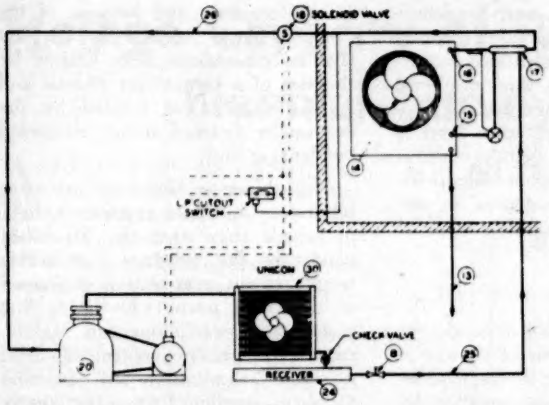
It is evident that as long as the head pressure is higher than the valve setting, valve (H) remains closed and the discharge vapor from the compressor follows its normal course. On a drop in head pressure, valve (H) opens and permits some of the discharge vapor to proceed

Fig. 5 (Below) Multiple use of fan motors with pressure switches to modulate air delivery.

Fig. 6 — (Right) Diagram showing modulation of effective condenser surface with "Winterstat," by partially filling condensers with liquid refrigerant.







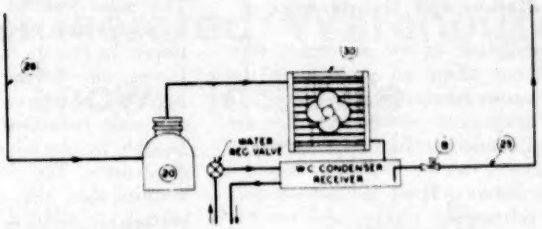


Fig. 7 (Left) Diagram of low pressure cutout switch arrangement suitable for winter operation.

Fig. 8 (Above) Diagram of unit condenser serving as a "booster" to existing water cooled condenser, 1

through the bypass line directly to the receiver. The amount of bypassed vapor is modulated by valve (H) depending on the pressure at its outlet.

The vapor flowing through the bypass restricts the flow of liquid from the condenser outlet, so that the lower tubes of the condenser coil become flooded, with the result that this portion of the condenser is rendered ineffective, and a rise in head pressure takes place. Due to the modulating action of valve (H) the flooded portion of the condenser can be regulated over a wide range.

The valve (H) itself is of rather simple design and its cost is comparable to that of a condenser water regulating valve. Use of this valve is not limited to the air-cooled unit condenser. It will be equally effective with any type of condenser.

Another problem peculiar to winter operation of outdoor air-cooled condensers in general, is encountered where operation of the compressor motor is controlled by a low pressure cut-out switch, (sometimes called a suction pressure switch) and where the ambient air at the condenser is at a lower temperature than the refrigerated space.

(Fig. 7) During the off-cycle, the pressure in the evaporator coil may tend to rise (in response to a rise in refrigerator temperature), sufficiently to cause vapor generated in the evaporator to flow through the suction and discharge line to the cold condenser, but not sufficiently enough to actuate the suction pressure switch which controls compressor operation.

In other words, the compressor fails to start in spite of the fact that the refrigerator requires cooling. This can be corrected by installing a solenoid valve (18) in the suction line, connected in parallel with the compressor motor. During the off-cycle, this solenoid valve is closed so that evaporator coil is isolated from the cold condenser. The feeler element of the suction pressure switch is connected to the suction line between the evaporator and the solenoid valve. The pressure switch will now be actuated by a rise in box temperature, opening the solenoid valve in the suction line and starting the compressor. Where the compressor is thermostatically controlled, the necessity for this system is eliminated.

Applications

Users of the air-cooled unit condensers have found it to be a very versatile device since it lends itself to a number of applications which cannot be accomplished as easily with any other type of condenser. For instance, the unit condenser can serve as a "booster" (desuperheater*) to an existing water cooled condenser (Fig. 8), with the water regulating valve closed except during the hours when the outdoor air temperature exceeds a predetermined maximum. This permits very considerable water savings, particularly in systems which operate the year round.

Another application in which the unit condenser is particularly useful, is the air-to-air heat pump. (Fig. 9). In a similar system the unit condenser can also serve as a re-evaporator for hot gas defrost. Or, it can be utilized as a source of heat for refrigerators requiring periodic heating, such as banana storage rooms or reefer cars.

The unit condenser can also serve as an exhaust ventilator for the compressor room or any other hot space during the summer (Fig. 10). By means of a simple duct and swinging damper, the room can be heated during the winter by the discharge air from the condenser. The unit condenser is particularly suited for use in residential air conditioning systems since its simplicity and freedom from maintenance insure automatic operation.

*See "Desuperheating Discharge Gas With Air Cooled Heat Exchangers," June '54, INDUSTRIAL REFRIGERATION.

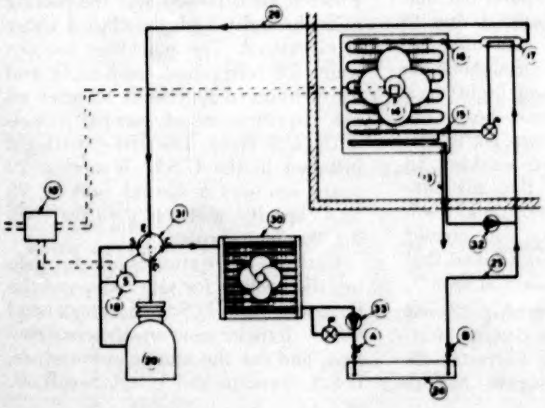
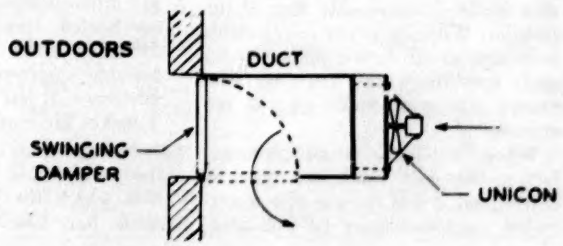


Fig. 9 (Left) Line diagram for hot gas defrost system using Unicon as re-evaporator.

Fig. 10 (Below) Diagram of Unicon arrangement for summer ventilation.



Installation and Maintenance

Installation of the air-cooled unit condenser offers no problem to the engineer or contractor who is familiar with evaporative condensers. The air cooled condenser, like an evaporative condenser, can be located at any desired distance from the compressor. The refrigerant piping and electric wiring for the unit condenser follow the same practice as has been established for evaporative condensers. It is not necessary to install the condenser at the same level as the compressor. It may be located above or below the compressor, and can be mounted indoors or outdoors.

When the condenser is mounted indoors, the air leaving can be ducted to the outside. For outdoor installations, wind deflectors may be used where the prevailing winds are likely to oppose the air discharge from the unit. The entire unit is constructed of non-ferrous materials. Where steel parts are used, they are suitably protected against corrosion so that the unit condenser is well suited for simple and inexpensive outdoor mounting.

Simplicity of design makes the unit condenser a logical choice for installations where all equipment must be fully automatic, and where no maintenance forces are on the job. The only maintenance operation is periodic oiling of fan motors, and infrequent cleaning of the fin surface where the air stream is likely to carry dirt or foreign particles. In belt-driven unit condensers, the fan bearing is permanently lubricated. The only additional maintenance operation in these units consists of tightening or replacement of the fan belts.

Limitations

While the advantages and the versatility of the unit condenser are unquestionable, it should by no means be considered the universal answer to every condensing problem. In areas where the summer design dry bulb temperature is higher than 100 degrees, and the wet bulb is comparatively low, serious advantages in favor of evaporative cooling should not be overlooked, particularly if the available water is reasonably free of impurities. While it is entirely feasible to design an air cooled condenser for such conditions, the required condenser size may make its use uneconomical.

Where air noise is an important factor, the unit condenser may be objectionable and the use of a water-cooled condenser may be indicated. The noise level of a unit condenser is comparable to that of a cooling tower. In certain applications requiring extreme quietness, this noise level may be considered excessive. Considerable reduction of noise level is feasible by the use of belt-driven unit condensers. The designer should ascertain that the condenser is not placed too near a building with 24 hour occupancy.

Summary

The remote air cooled condenser is perhaps the most direct answer to the water and sewage shortage problem. Its growth and acceptance by the industry were delayed because of the absence of information about its performance and because of the "mental block" created by the fact that its dimensions were limited by the size of a compressor chassis and its air supply was limited by the economies dictated in an air-cooled condensing unit.

This paper is based on extensive laboratory and field experience, both of which show that the air-cooled condenser can produce comparable results to an evaporative condenser or a cooling tower with lower first cost, lower installation and maintenance cost, easier control of head pressure, elimination of freezing problems, freedom from water supply and disposal problems without plumbing, and with a saving in space.

Navy Combat Vessels Air Conditioned

THE largest air conditioning system ever installed on a navy combat vessel will go into action in the newly christened U.S.S. Forrestal, it was announced recently by Carrier Corporation, the nation's leading air conditioning manufacturer. Inauguration of the modern new system marks nearly three decades of improving fighting efficiency through air conditioning, since Carrier placed the first major installation in operation aboard the battleship U.S.S. Wyoming in 1925.

Seven Carrier centrifugal refrigeration machines furnishing a total of 1,050 tons of cooling will provide air conditioning and refrigeration for the vessel, one of the world's three largest fighting ships. The amount of cooling produced would completely air condition more than 500 average size three-bedroom houses and is equivalent to the melting of 2,100,000 pounds of ice over a 24-hour period.

Air Conditioning Essential

U.S. Navy engineers point out that air conditioning is essential due to the tremendous heat generated by the machinery located throughout the ship and by her all-steel flight deck which absorbs the sun's heat. Experts have found that men get lethargic when sleeping and working in overheated areas and that air conditioning, good recreation, and comfortable quarters make for greater efficiency. It has also been found that it makes life more pleasant at sea.

Never before has any ship offered the possibilities for maximum alertness which the U.S.S. Forrestal affords her 3,500-man crew. Sailors will descend broad stairways into air conditioned quarters, recreation and messing areas. An outlet placed over each pullman-type bunk will provide the occupant with conditioned air, cooled, and dehumidified.

Many of the working spaces in the 1,036-foot steel hull will also be air conditioned such as the pilot's ready rooms, communications and combat information center, control compartments from which personnel operate the main propulsion plant, and other areas where personnel are enclosed for long periods.

The seven Carrier refrigerating machines produce cooling by centrifugal compression of refrigerant gas through the action of finely balanced rotors 16 inches in diameter and spinning at 7,270-revolutions per minute inside a metal shell, rather than by a piston inside a cylinder as in the normal household refrigerator.

The refrigeration machines supply chilled water which is pumped to the central air conditioning equipment. Filtered air is passed over the cooling coils through which the chilled water is circulated. The machines use sea water for refrigerant condensing and were designed and built to meet all the requirements of combat vessels of the U.S. Navy. The first centrifugal installed in the U.S.S. Wyoming 29 years ago was a special unit of 95 tons capacity, and was used for cooling the engine room.

Carrier Corporation is also furnishing the cooling for sister ships of the Forrestal, the U.S.S. Saratoga and U.S.S. Ranger now under construction, and for the atomic submarines, U.S.S. Nautilus and U.S.S. Sea Wolf.

Storage Capacity of Refrigerated Warehouses
Biennial Survey Shows Increase

A REPORT on the capacity of refrigerated warehouses in the United States as of October 1, 1953, has been issued by the Production and Marketing Administration of the United States Department of Agriculture.

One important change was made in the 1953 survey. For the first time, freezer space is defined as that refrigerated at 19 F or below, whereas in previous surveys freezer space was that refrigerated at 29 F or below. Cooler space is the refrigerated space above those temperatures. The change was made in accordance with changing trade practice and with recommendations of the industry.

National Capacity

National refrigerated capacity totaled 748,050,000 gross cubic feet on October 1, 1953 (Table 1), a net gain of 37,034,000 cubic feet in the 2-year interval since the last previous survey. A decade ago, national warehouse capacity was 651,266,000 cubic feet. During the 1943-53 decade, warehouse capacity was increasing at an average rate of more than 19,000,000 cubic feet every two years, the surveys showed, whereas in the previous 10-year period, 1931 to 1941, the average rate of growth was about 5,000,000 cubic feet every two years.

Many factors have contributed to the growth of the warehousing industry since the 1930's. These included technological advances and improvements in equipment and transportation facilities, a better knowledge of product handling and storage environment which helped to preserve the quality of foods stored under refrigeration, wider consumer acceptance of cold storage products, increased volume of frozen food production, and an ever-growing variety of foods marketed in a frozen state.

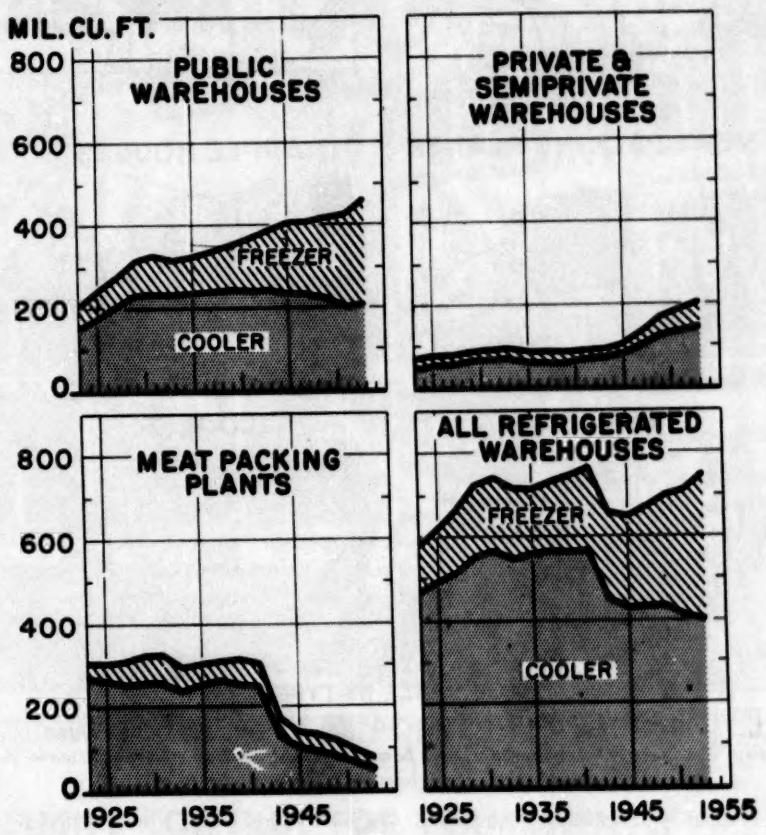


Fig. 1 — Distribution of gross refrigerated space by temperature range and by type of warehouse — 1925-1955.

Because of the upward trend in frozen food production, the warehousing industry found it necessary to reappraise its ability to provide adequate space of the right kinds, to facilitate the distribution of the growing volume of frozen foods.

Heretofore, space requirements for apples during the fall and winter and for shell eggs during the spring and summer emphasized the need for cooler space almost to the exclusion of freezer space. In 1923, ap-

TABLE 1. — TOTAL REFRIGERATED STORAGE CAPACITY, BY TYPE OF WAREHOUSING OPERATION, UNITED STATES, OCTOBER 1, 1953

Type of refrigerated warehouse	Plants	Gross space			Net piling space		
		Freezer	Cooler	Total	Freezer	Cooler	Total
	Number	1,000 *cu. ft.*	1,000 *cu. ft.*	1,000 *cu. ft.*	1,000 *cu. ft.*	1,000 *cu. ft.*	1,000 *cu. ft.*
Public general	666	256,751	168,575	425,326	183,561	124,211	307,772
Private and semi-private general	499	58,606	42,935	101,541	42,820	32,154	74,974
Meat-packing plant	198	29,242	49,847	79,089	18,841	34,789	53,630
Apple houses:							
Public	107	1,117	40,027	41,144	910	32,931	33,841
Private and semi-private	502	1,612	99,338	100,950	1,342	80,617	81,959
Total	1,972	347,328	400,722	748,050	247,474	304,702	552,176

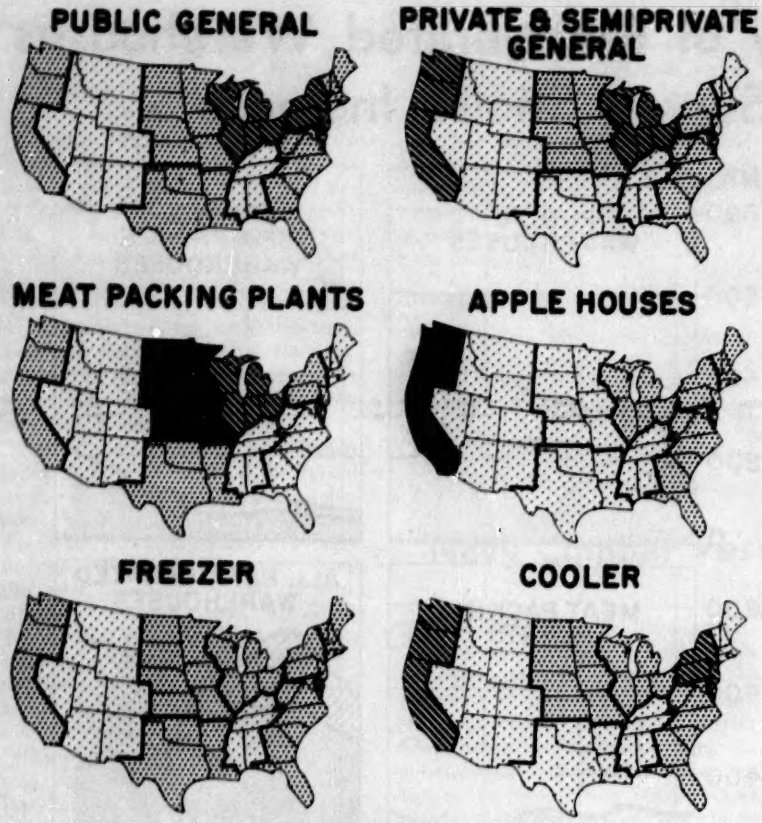


Fig. 2 — Gross refrigerated space, percentage distribution of type of warehouse space by regions — October 1, 1953.

proximately four-fifths of the national refrigerated capacity was in the temperature range of coolers. By 1933, however, cooler space accounted for three-fourths of the national capacity, and in 1943 it was down to seven-tenths of the total. On October 1, 1953, only a little more than half (54 percent) of the national total refrigerated capacity, or 400,722,000 cubic feet was cooler space (Table 1).

With a slackening demand for cooler space, especially in concentration and terminal market areas, the warehousing industry, particularly operators of public, private, and semiprivate general warehouses, began to convert all or major portions of their cooler rooms into freezer rooms and to build new facilities in areas close to points of production.

Expansions, conversions, and new construction brought gross freezer space up to 347,328,000 cubic feet by October 1, 1953 (Table 1). By comparison, national freezer capacity was 201,757,000 cubic feet in 1943 and only 169,753,000 cubic feet in 1933. The average annual rate of growth during the 10-year interval from 1943 to 1953 was almost 15,000,000 cubic feet as compared with slightly more than 3,000,000 cubic feet per year in the period from 1933 to 1943.

Public Warehouse Space

Much of the food being held under refrigeration is stored in public warehouses. During 1952, public warehouse facilities held about 80 percent of the frozen poultry stocks in storage, about 85 percent of the butter, about 50 percent of the meat and meat products, and about 80 percent of the total frozen fruits, vegetables, and juices.

During the last seven years the output of frozen foods has more than tripled. The limit of this expansion has not yet been reached.[1] Whatever the expansion in the future, public warehouses may still be called upon to store the major portion, not only because of their strategic location in intermediate and urban centers but because of their ability to service the frozen food industry adequately by virtue of their number and capacity (Fig. 2).

Although growth was not as rapid for public warehouse space as for frozen foods, a trend was evident as successive surveys were completed. In 1921, the public warehouse space totaled 194,167,000 gross cubic feet, only slightly more than one-third of the national capacity of all types of warehouses.

The extent to which freezer space was concentrated in public facilities of all types was evidenced by the fact that almost three-fourths of the national freezer capacity was classified as public on October 1, 1953. It amounted to 257,868,000 gross cubic feet, a net gain of more than 37,000,000 cubic feet since 1951.[2] To reach this volume, the industry's growth was quite consistent during the last 30 years with the sole exception of 1933; at that time a slight reduction occurred. As an example of this growth pattern, freezer space in public facilities in 1953 was almost twice the capacity available in 1943; three times that in 1933; and almost five times that in 1923.

Public warehouse gross space, freezer and cooler, was approximately 2.92 cubic feet per capita as computed from the July 1, 1953, estimate of total population (including armed services abroad) and the October 1, 1953, space survey. Projected estimates of population in 1955, based upon Bureau of the Census reports, indicated a population between 164.4 and 164.8 million persons.[3] Should the public warehousing industry continue the 1953 per capita relationship into 1955, the eighteenth biennial space survey may show that public warehouse space increased to a total of at least 480,000,000 gross cubic feet, of which 266,000,000 cubic feet would be freezer space.

Private and Semiprivate Warehouse Space

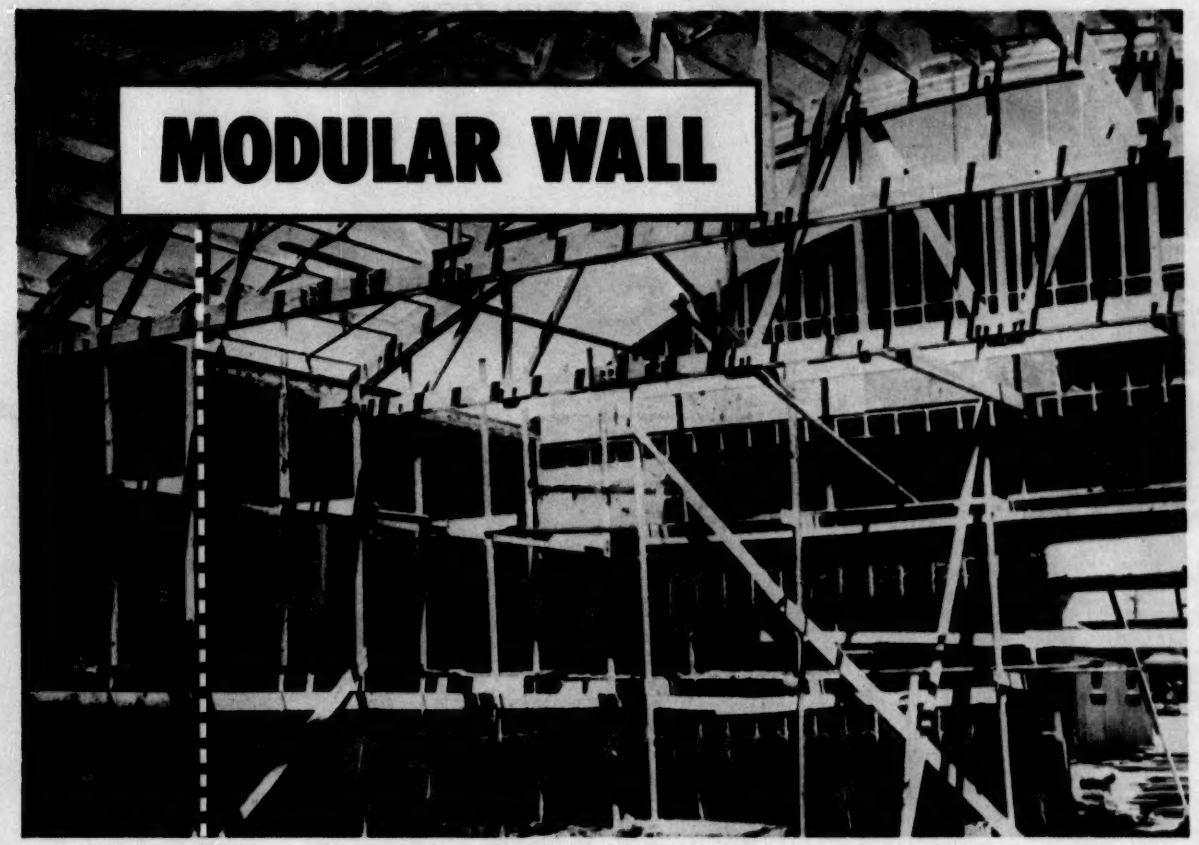
Ever since 1941 there has been a significant increase in the refrigerated storage capacity of private and semiprivate space, especially in the freezer range.

In 1953, gross storage space classi-

[1] Bitting, H. W. Purchases of Frozen and Canned Foods by Urban Families as Related to Home Refrigeration Facilities. U.S. Dept. Agr. Mkt. Res. Rpt. 60, p. 1. 1954.

[2] The gain may have been somewhat larger than this, because a part of it may have been concealed by the new basis for reporting freezer space.

[3] United States Bureau of the Census. Current Population Reports, Population Estimates, Ser. P. 25, No. 78, 6 pp. 1953.



Typical modular wall engineering illustrates use of horizontal insulation board bridging on 4' to 8' centers. This facilitates uniform control of Palco Wool Insulation density and permanent void-free efficiency. Note how insulation remains in place for final inspection of entire wall before interior sheathing is applied.

—AIDS DENSITY CONTROL FOR PERMANENTLY VOID-FREE PALCO WOOL INSULATION

Division of open walls into modules by horizontal blocking and bridging, required by many building codes, also provides for the most efficient installation of Palco Wool Insulation:

1—Proper allocation of material can be made for more uniform fill-pack density.

2—Permanence of void-free installation can be assured, since lifetime resilience of Palco Wool packed to proper uniform density is easily self-supporting in normal modular areas.

Horizontal dividers should be of approved insulation board so as not to detract from overall insulating efficiency of Palco Wool, which can be put in place through entire wall areas and fully inspected for void-free application before interior sheathing is applied. For the most effective cold storage insulation available, specify Palco Wool with modular wall design.

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PALCO INSULATION WOOL

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Please send me, without obligation:

- ☐ Sample of Palco Wool Insulation
- ☐ More details on Modular Wall Construction
- ☐ Complete Cold Storage Manual

Name_____
Title_____
Company_____
Address_____
City_____ Zone____ State_____

fied as private and semiprivate totaled 202,491,000 cubic feet as compared with 187,673,000 cubic feet in 1951. It is within the freezer range, however, that this industry's growth may be measured.

From 1943 to 1953, there was a net increase in private and semiprivate freezer space of more than 44,000,000 cubic feet. It was during this 10-year period that this industry almost quadrupled its freezer capacity. Generally, these increases took place in centers of frozen food production; consequently, there was a concentration of private and semiprivate space in the South Atlantic and Pacific regions.

Freezer capacity in each of these areas totaled almost 16,000,000 cubic feet. Collectively, the areas accounted for more than half of the freezer space in private and semiprivate facilities. Florida, Washington, and California, because of their many juice and food processing plants, were the chief locations for private and semiprivate warehousing operations in their respective geographic regions.

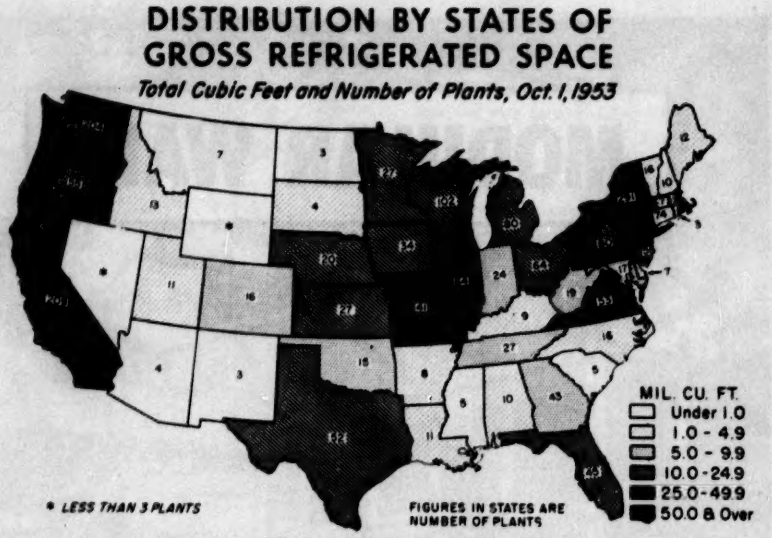

DISTRIBUTION BY STATES OF GROSS REFRIGERATED SPACE
Total Cubic Feet and Number of Plants, Oct. 1, 1953
MIL. CU. FT.
Under 1.0
1.0 - 4.9
5.0 - 9.9
10.0 - 24.9
25.0 - 49.9
50.0 & Over
* LESS THAN 3 PLANTS
FIGURES IN STATES ARE NUMBER OF PLANTS

Fig. 3 — Distribution by states of gross refrigerated space. Total cubic feet and number of plants — October 1, 1953.

Capacity By Regions

In 1953 as in 1951, the refrigerated warehouse capacity in the Pacific region was the largest of all. The 191,467,000 gross cubic feet compares with 147,334,000 cubic feet reported in the Middle Atlantic region, which ranked second, and 141,464,000 cubic feet in the third ranking region, the East North Central. Next in order was the West North Central, the South Atlantic region, followed by the West South Central, New England, East South Central, and Mountain.

With two exceptions, all regions shared in the national net increase in gross space since 1951. The exceptions were the New England and East North Central regions, where reductions of more than 1,000,000 cubic feet occurred during the 2-year interval since the last survey. Appreciable gains, however, were reported in the South Atlantic region, particularly in Florida; in the Pacific region, mostly in California, and in the West North Central region, notably in Kansas. The largest regional increase of the three was approximately 14,000 cubic feet in the South Atlantic. In the Pacific, almost 12,000,000 cubic feet was added as compared with approximately 7,000,000 cubic feet in the West North Central.

Public General Warehouses

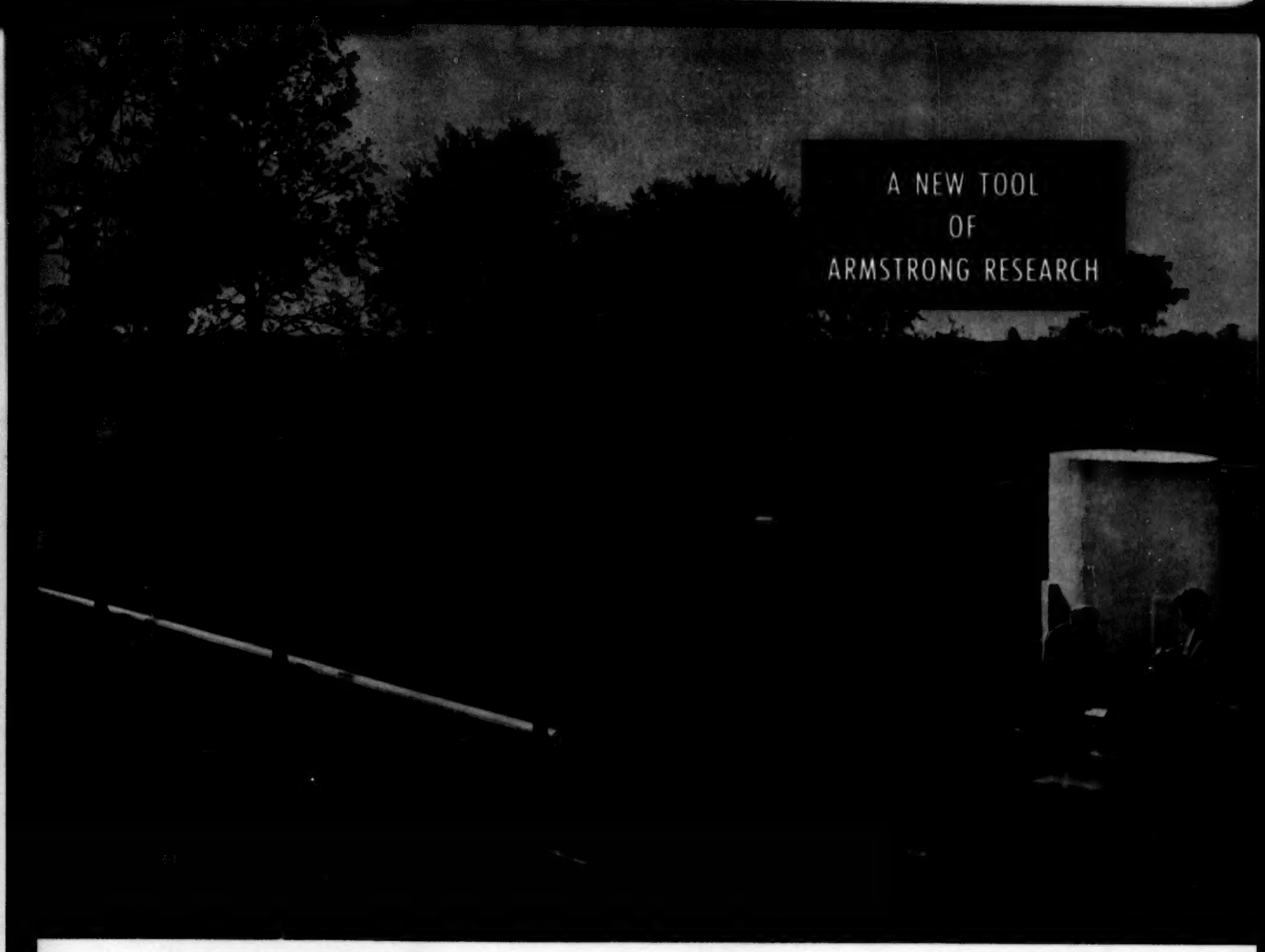
The largest element in the refrigerated warehouse system is the public general warehouse facility. This type of facility accounted for almost three-fifths of the national refrigerated gross capacity. The number of public general warehouses, however, was only one-third of the total facilities reported in the 1953 survey.

Public facilities, exclusive of public apple houses, reported a gross storage capacity of 425,326,000 cubic feet, of which 256,751,000 cubic feet was in the freezer range (Table 2). Their capacity in 1953 was more than 50,000,000 gross cubic feet greater than in 1951 as a result of net gains in all geographic regions. Public space in the West North Central States was increased by almost 14,000,000 cubic feet, and in the East North Central by almost 12,000,000 cubic feet. South Atlantic facilities reported a gain of more than 8,000,000 cubic feet. On the west coast, an additional 6,000,000 cubic feet was made available for the general public, but only 4,000,000 was added in the Middle Atlantic States. In other areas, smaller gains were reported, varying from less than 1,000,000 to slightly more than 2,000,000 cubic feet.

Middle Atlantic and East North Central States were the principal areas for the location of public general warehouse facilities (Fig. 3). Between them they accounted for 45 percent of the total public general space in the country. These two re-

TABLE 2. — REFRIGERATED STORAGE CAPACITY OF PUBLIC GENERAL WAREHOUSES, BY REGIONS, OCTOBER 1, 1953

Region	Plants	Gross space			Net piling space		
		Freezer	Cooler	Total	Freezer	Cooler	Total
		1,000	1,000	1,000	1,000	1,000	1,000
	Number	*cu. ft.*	*cu. ft.*	*cu. ft.*	*cu. ft.*	*cu. ft.*	*cu. ft.*
New England	35	15,298	5,439	20,737	9,866	3,640	13,506
Middle Atlantic	135	57,980	45,183	103,163	40,283	33,830	74,113
East North Central	91	45,232	43,478	88,710	31,571	31,199	62,770
West North Central	69	32,685	19,982	52,667	23,694	14,864	38,558
South Atlantic	99	24,027	17,056	41,083	18,161	12,798	30,959
East South Central	32	8,101	5,210	13,311	5,935	4,064	9,999
West South Central	49	17,834	7,833	25,667	12,905	5,932	18,837
Mountain	27	6,009	2,004	8,013	4,571	1,556	6,127
Pacific	129	49,585	22,390	71,975	36,575	16,328	52,903
United States	666	256,751	168,575	425,326	183,561	124,211	307,772



Tank Farm . . . *ideas grow into insulation specifications at this unique testing unit*

To study scientifically the effects of weather on insulations and protective finishes, Armstrong recently built a unique outdoor Tank Farm. Here, new and old insulation specifications and materials are evaluated under field operating conditions. Both high and low temperatures are held in a variety of pressurized, commercial and domestic oil tanks, and in a wide assortment of pipe lines.

The Tank Farm's equipment is extremely flexible so that insulation can be applied by one method and, if desired, replaced at any time to meet a completely different specification. Tests indicate which materials and methods warrant further development to replace current specifications.

This Tank Farm is but one example of how Armstrong Research is constantly working to improve industrial insulation materials and to develop simpler, more economical specifications. For full details on the Armstrong Line of industrial insulations and complete Contract Service, call your nearest Armstrong office or write Armstrong Cork Company, 206 Stratton St., Lancaster, Pennsylvania.

Study of new insulations, finishes, and methods of applying them is a continuous program of Armstrong Research. A new specification for applying corkboard is being made ready for testing on this experimental low-temperature tank.

Armstrong INDUSTRIAL INSULATIONS

gions and Pacific Coast States, combined, controlled 62 percent of the national public general warehouse capacity. In the forefront, however, were the Middle Atlantic States with more than 20 percent of the national public freezer space and more than 25 percent of the public cooler space.

Capacity by Cities

Listed in the survey are cities with three or more warehouses having a gross capacity of at least 3 million cubic feet in 1953. Except for those centers engaged primarily in the storage of apples on the east and west coasts, almost all of the cities listed are concentration or terminal market points. There were as many centers in 1953 east of the Mississippi River as west, but the western cities, with a collective capacity of 206,999,000 cubic feet, were outranked by the cities east of the Mississippi, where warehouse capacity totaled 251,166,000 cubic feet.

The gross warehouse capacity of Chicago, the first ranking city, was more than one-third greater than that of the second ranking city, New York. Chicago had 61,189,000 cubic feet, although this storage capacity was in fewer warehouses than were reported in operation in New York. The importance of the apple storage industry in the State of Washington was indicated by the ranking of Yakima as third and Wenatchee as fifth on the basis of gross warehouse space. St. Louis, also west of the Mississippi, ranked fourth.

Although the ranking of these cities was identical to that in 1951, Chicago strengthened its hold on first place with an increase of almost 4,000,000 cubic feet, while in St. Louis, warehouse space was reduced by a like amount. This space loss, however, was accounted for by the exclusion of smoking and curing space in meat packing plants in 1953, which was not excluded in the 1951 survey. For New York, Yakima, and Wenatchee, warehouse capacity was not changed significantly. Adjustments, up or down, were not of sufficient size to affect their relative rank among the first five cities.

Public General Warehouses

The practice of locating warehouses in heavily populated cities accounted for the leadership of New York and Chicago as centers for public general warehousing. New York had the greatest number and capacity of public general warehouses of any city. On October 1, 1953, the 27 plants in the city and within a 25-mile radius of it had a collective gross capacity of 40,356,000 cubic feet. The net gain of more than 4,000,000 cubic feet since 1951 was a result of remodeling, expansion, and reclassification of non-public operations to public. Chicago's public general warehouse space, too, increased since 1951. The second ranking city increased its space for the public's use by more than 9,000,000 gross cubic feet to bring the city total up to 40,279,000 cubic feet. This capacity almost enabled Chicago to recapture first place which was lost in 1949 to New York.

Meat packing space in cities in New York, Illinois, Missouri, Wisconsin, Minnesota, Iowa, Nebraska and Texas accounted for more than two-fifths of all the gross space in meat packing facilities in the country. Chicago and St. Louis together had over 13,000,000 gross cubic feet. Omaha was next in order of importance followed by Minneapolis-St. Paul and New York, in the order named.

Frozen Food Convention Chicago March 13-16

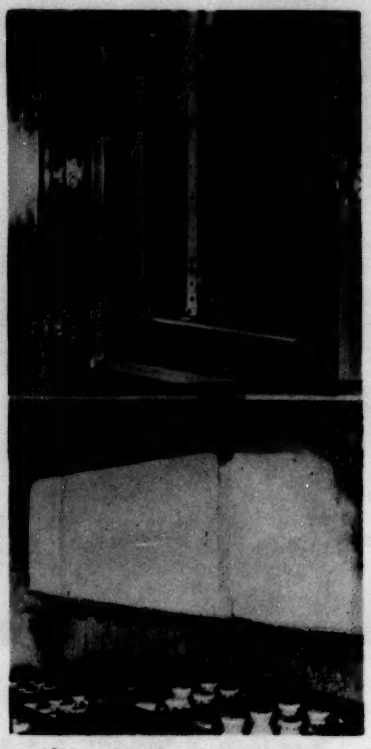
THE 1955 National Frozen Food Convention will be held at the Conrad Hilton Hotel in Chicago, March 13—16. It will be sponsored jointly by the National Association of Frozen Food Packers and the National Wholesale Frozen Food Distributors. Additional participants will include brokers, warehousemen, retail and chain operators, suppliers, transportation representatives—and all others having a stake in the frozen food industry. With the entire industry again meeting together, the 1955 convention promises to be the greatest ever held.

Both the packers' and distributors associations are planning series of very important meetings, designed to be of the greatest possible value to the industry. And in addition, of course, there will be the traditional social events which have been so successful at past frozen food conventions. The schedule of events includes an industry reception, March 13, industry breakfasts on March 14, 15 and 16 and the grand banquet on March 16. Registration will begin March 13.

An additional important feature of the 1955 convention will be the National Frozen Food Convention Exposition, sponsored by the National Wholesale Frozen Food Distributors. This will be an opportunity for every segment of the industry to exhibit equipment, products, supplies, etc.

Hold-Over Cold Plates For Truck Refrigeration

FOR 12 years Peter Eckrich and Sons have been using Hold-Over plates in their route delivery trucks. Central refrigeration systems in the company garages charge up the plates overnight, and the cold is held over by the plates during the 10 to 16 hours these trucks are on the road.



Above: Hold-over plate in route delivery truck of Peter Eckrich & Sons.

Below: Interior of dairy truck operated by Santa Barbara dairy.

George F. Glover, manager of the Santa Barbara dairy, reports installation of Kold-Hold Hold-Over plates in their fleet of 22 trucks has given every driver-salesman for the firm an extra hour each day to make more deliveries and do more sales work. Trucks are loaded in the afternoon, eliminating confusion of loading and icing when drivers arrive the next morning. Trucks are ready to leave the dock immediately after the driver checks in. Refrigeration lines from the plant cooling system are connected to each truck at night, making it a "cooler room on wheels." The fleet includes wholesale ice cream trucks, combination wholesale ice cream and milk trucks and house-to-house retail milk delivery trucks.

Scientific Advisory Council Reviews Research and Technical Subjects

FOR its annual review of research and technical problems related to refrigerated warehousing and refrigeration in general, the Scientific Advisory Council of The Refrigeration Research Foundation met January 13 and 14 in Edgewater Beach Hotel, Chicago.

This annual meeting, arranged and directed by H. C. Diehl, Director of TRRF brings together the 20 members of the Council, who are scientists in various government and university positions in the United States and Canada, a number of scientists who lead projects aided by the Foundation, and also members of the Foundation. The meeting combines the scientific evaluation of progress and planning for investigations with the practical industrial evaluation and point of view.

In addition to members of the cold storage industry, the meeting also brings together men from the refrigeration engineering, meats, poultry, packaging, transportation, fisheries and other industries. These industries are customers of refrigerated warehouses, or in some instances collaborative service industries.

Group Discussions

The first day, January 13, was devoted to Task-Group discussions. Divisions of the entire group met separately to discuss the following subjects: Engineering Problems, Dairy Products, Fisheries Products, Functional Packages, Meats, Bakery Products, Frost Heaving, Poultry Products, Fruits, Vegetables, Nuts, and Frozen Food.

All day on Friday, January 14, the entire group heard reports from the Task Groups and discussed, in detail, technical progress in industry and research and recommendations for new research undertakings.

Both Dr. L. C. Prescott, Chairman of the Board and W. A. Sizer, President of The Refrigeration Research Foundation, attended the sessions on Friday and spoke briefly on the encouraging outlook for the Foundation and the importance and value of its activities.

In the reports of the task groups, numerous suggestions and recommendations were made. These will have basic value in the guidance of the Foundation's program during the coming year. A number are listed below, and while they do not represent fixed Foundation policies or program they do represent areas of activity in which the Foundation has definite interest and in which it is active in a major or minor way.

Recommendations Partial list

1. Several groups recommended that the Foundation continue to collaborate with package manufacturers in the promotion of improvement in packages. Packaging is extremely important in the success of frozen and refrigerated goods and excellent opportunities lie open in that direction.

2. The task group on Fisheries Products recommended a program looking toward improvement in product quality and eventual voluntary standards for products. The reason for voluntary standards is facilitation of orderly marketing, as well as fixing of responsibility for quality.

3. It was recommended that the full force of the Foundation's encouragement be directed toward improved handling of the rapidly increasing volumes of frozen foods. The frozen foods industries are growing at a tremendous rate — and research and technology must really stretch to keep up with the needs.

4. It was recognized that one barrier to the sale of frozen meats (and possibly certain other frozen foods) is price; therefore every effort should be made to mechanize operations so that cost of handling foods will be lowered and so that qaulity will be improved.

5. Since shrinkage remains one of the major problems in frozen meats, it was recommended that packaging and other problems related thereto be investigated further.

6. Further investigation of means for the measurement of humidity and control of temperatures in freezers was urged.

7. Although the entire program of the Foundation was reviewed, some special attention was given to the project on frost heaving at University of Minnesota, under Prof. R. C. Jordan, and with the aid of ASRE. This project is collecting a wide range of information and is enlisting the aid (through installation of thermocouples) of those who are presently building freezer floors at ground level.

8. The task group on packaging pointed out a need for data on respiration rates of fruits and vegetables through various storage temperatures and types of atmospheres. The group also recommended attention to accurate data on stacking strength of cases.

9. The Foundation's development of projects on condensation or products on removal from low temperature was commended.

10. Similarly, the Foundation's development of work on the freezing of baked goods was approved.

Leaders of Task Groups

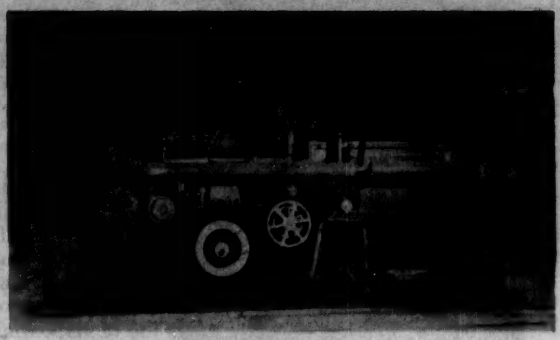
Leaders of the task groups were Prof. Carl F. Kayan, Columbia University (Engineering Problems); Dr. William H. Cook, National Research Council of Canada (Dairy Products); Prof. B. E. Proctor, Massachusetts Institute of Technology (Fisheries Products); Dr. L. V. Burton, Packaging Institute (Functional Packages); Dr. C. H. Koontz, Swift & Co. (Meat Products); Dr. George Garnatz, Kroger Foundation (Bakery Products); Prof. R. C. Jordan, University of Minnesota (Frost Heaving of Freezer Floors); Prof. George F. Stewart, University of California (Poultry Products); W. T. Pentzer, USDA, Beltsville, Md. (Fruits, Vegetables, and Nuts); H. J. Humphrey, General Foods Corp., White Plains, N. Y. (Frozen Foods).

Liquid Egg Production

THE U. S. Dept. of Agriculture reports that liquid egg production during December 1954 totaled 14,290,000 lbs. compared with 14,730,000 lbs. in December 1953 and the 1948-52 average of 10,845,000 lbs. Dried egg (egg solids) production totaled 1,336,000 lbs. compared with 1,242,000 in December a year earlier and the average production of 2,208,000 lbs. Production of frozen eggs during December 1954 totaled 3,641,000 lbs.

Acerola A New Juicy Fruit

THE ACEROLA, a wild Puerto Rican berry (now being domesticated) whose juice contains many hundred times as much Vitamin C (ascorbic acid) as oranges. This fact was discovered in 1945 and BIB Corporation, Subsidiary of Sasson-King, Inc., Lakeland, Fla., now plans to put the juice on the market, to be blended with other juices, according to Business Week, November 13, 1954.



Above: F. C. Hooper and mechanic check operation of the heat pump at its arc arctic location. The project, under the sponsorship of the Canadian Research Board, Defense Research Board, ran successfully for two years.

Top right: The ice pulverizing unit of the heat pump disperses the ice into the atmosphere after the "heat" has been recovered in the heat exchangers.

Bottom right: Front view of arctic heat pump, taken in F. C. Hooper's Laboratory at the University of Toronto shows the compact and sturdy construction of the unit. Note the ski-like construction of the bed plate.

Heat Pump Conserves Fuel in the Arctic

A heat pump has been developed by the Canadian Defense Research Board for use in arctic locations which will result in savings of fuel. New controls are being developed to safeguard equipment, a prime requisite when facing problems involving great expense in supplying remote locations with products necessary for survival.

THE Arctic Circle cuts through the northern part of Canada. The are above this imaginary line, although desolate, is important. For purposes of national defense and meteorology, the Canadian Government maintains weather stations, military establishments and research test centers there. The government must constantly face the problems presented by these remote outposts to those who would inhabit them. The area is not unfriendly; it is simply remote, largely inaccessible and cold.

The delivery of supplies is a major problem. Dog-sledding days are over and air delivery is expensive. Also, many of the establishments are cut off from air delivery for long periods of time. Storms, high winds and deep snow create impossible flying conditions.

Supplies, therefore, must be wisely conserved and judiciously expended. Safeguards must be taken to insure that they are.

As a further measure to reduce expenses and increase the efficiency of operations at the arctic locations, the Canadian Government is constantly sponsoring tests of and investigations into new equipment. A principal agency of the government in conducting such inquiries is the Canadian Defence Research Board. Since it is not a bit unusual for the cost of supply delivery to exceed the cost of the supplies themselves, any test or trial that has even a remote chance of succeeding is a good investment, because occupation of the arctic area and concern for it will only increase in the future—not decrease—and small investments now are bound to be very profitable in the future.

Several years ago, a research team of the University of Toronto under the direction of Mr. F. C. Hooper was asked by the Canadian Defense Research Board to develop a heat pump for use in arctic locations. The object of the pump was to conserve fuel. Conventional heating units were consuming inordinate amounts of fuel.

The Board's opinion turned out to be quite right. A heat pump was designed by Mr. Hooper and was installed and operated at an arctic station for over two years. Fuel was saved and the equipment protected by an automatic shutdown system using Honeywell industrial controls. The results were economy, efficiency, and safety of operation.

Principles of Heat Pump

The heat pump that Hooper developed works on the unique principle that there is latent heat in the fusion of ice. This is a practical and consistent source of energy at an arctic location. It is made available in a usable form by drawing 32 F water from beneath the ice surface of lakes. This is the highest temperature source obtainable at the scene of operations.

Ice is manufactured from the lake water by means of a refrigeration compressor, belt-driven by a diesel

Reprinted by permission of Minneapolis-Honeywell Regulator Company.

engine. The exhaust and cooling water "heat" is recovered in heat exchangers and is then available for distribution where needed. The ice produced is disposed of through a rugged fan which pulverizes it and disperses it into the atmosphere.

The unit saves fuel costs—the intent of its design—by supplying about twice as much heat per unit of fuel as a conventional heater will supply. It produces about 40,000 Btu's per pound of fuel compared to 15,000 Btu's average for a heater.

Automatic emergency shutdown for the heat pump is necessary because: (1) the ice-disposal system might jam; (2) the refrigerant might escape from the compressor; or, (3) the condenser cooling(heating system) might fail. If any of these situations arose and the diesel engine continued to operate, damage would occur.

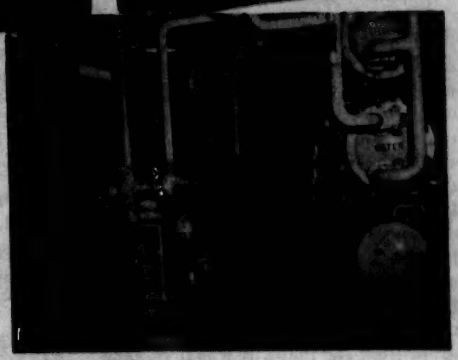
The answer was to place in the system a *Modutrol* motor which would close the diesel engine fuel supply line if a mercury switch on the ice-disposal system or cut-out switches on the refrigerant compressor tripped. One of the cut-out switches trips in if the pressure is too high, and the other trips in if the pressure is too low. The mercury switch on the ice-disposal system cuts in if the machine stops and ice accumulates. The source of power for the *Modutrol* motor is a small generator run by the diesel engine.

As proof of the pudding, there were, very naturally, some failures in the compressor and ice-disposal unit during the test. The automatic shutdown worked perfectly and the equipment was saved from damage. Also, from reviewing the things that did go wrong during the test, Hooper devised a diesel engine temperature limit control to be used during the next experiment. He plans to connect it to the same *Modutrol* motor to provide an additional safety feature for the power unit.

Frozen Food Quality Control

AT a jointly sponsored NARW-TRRF meeting in Chicago, refrigerated warehousemen continued their efforts to develop ways for providing maximum quality control for frozen food products. Particular emphasis was placed on temperature recording. Plans were also laid for future development of simplified temperature testing practices to be used on incoming shipments.—NARW Cold Facts.

Sioux City Dressed Beef Company, Inc.
Sioux City, Iowa.



for the
MOST MODERN
REFRIGERATION
in
dressed beef
plants

CHECK with VILTER

THE PLANT—Another outstanding addition to the Sioux City packing industry is the new Sioux City Dressed Beef Company plant. Modern in every respect . . . this plant is completely streamlined, all processing operations and handling are on one level. From past experience, the management was well acquainted with the excellent performance of Vilter refrigeration equipment . . . so Vilter engineering and units were the natural choice for the refrigeration job.

THE SYSTEM—The refrigeration layout comprising Vilter units is as follows: *Large Chill Room* which holds approximately 400 beef, three 1750 FUB 12-row coils; *Freezer* which is used for freezing all the offal, one FUA 1500 10-row coil; *Offal and Packing Cooler*, one 750 FUB air vent with 12-row coil; *Hide Cellar*, two 180 DUC units; *Machine Room*, a Vaporiter to handle the high suction plus the discharge from the booster compressor. Two Vilter six-cylinder compressors take the full load. Refrigeration is fully automatic.

THE TESTIMONIAL—After months of operation, the management of the Sioux City Dressed Beef Company are happy with the Vilter refrigeration system. When you kill beef one day and ship the next, you have to have refrigeration of the best—that's why they chose Vilter.

THE ANSWER—The answer is always Vilter. With Vilter you can be sure. With a research staff probing into future needs and seeking better ways . . . with units engineered for the job . . . with construction by craftsmen who take great pride in their work, it is no wonder that Vilter units are known for their long, trouble-free operation and efficient performance. Let Vilter engineer your next refrigeration job.

Vilter.

Your nearby VILTER Representative or Distributor will be glad to show you how VILTER refrigeration can help you.

REFRIGERATION and AIR CONDITIONING

THE VILTER MANUFACTURING COMPANY, MILWAUKEE 7, WIS.

Air Units • Ammonia & Freon Compressors • Booster Compressors • Bonded Coolers • Water and Brine Coolers • Blast Freezers • Evaporative & Shell & Tube Condensers • Pipe Coils • Valves & Fittings • Pakice and Polarflake Ice Machines

The Economics of Ice Distribution—How to Cut Costs and Serve Customers

E. K. WELLMAN
Detroit City Ice & Fuel Co.
Detroit, Mich.

A STUDY of statistics collected by our company over recent years showed clearly two things we had to do: we had to increase our margins and, with an increased labor cost, cut our costs.

We took a map of the State of Michigan and divided it into sections according to mileage. We found several towns where there was practically no ice business, where there was no ice for sale. So we started in to establish dealers. Then the cost of delivering this ice became a distribution problem. Regardless of the distance from our main plant, we delivered it at the dock price, but the cost of distribution varied. We put in a time study and we found we could deliver ice economically 150 miles from the plant. It was necessary for some of these dealers to increase their price slightly, but we have found in these areas that it didn't make much difference what they paid for ice as long as they could get it the way they wanted it and when they wanted it.

Transportation Costs

We compiled some transportation cost figures, based on gasoline per mile, and depreciation on the truck. These figures show what we came up with after an actual study. We figured the labor on a five-ton truck was $1.78 an hour, and six miles per gallon of gas. Now, if we go five miles from the plant, it costs us 83 cents a ton. On a 10-ton truck, figuring four miles to the gallon, 44 cents a ton. And on a 14-ton semi-trailer, 40 cents a ton, figuring three miles to the gallon. The truck-hour cost figures about $1.50 an hour.

Now, let's take a 20 mile trip. It is $1.88 for 20 miles, on a 5-ton truck; 95 cents per ton on a 10-ton truck, and 83 cents a ton on a 14-ton semi-truck.

For 50 miles away, which we considered impossible to go, at one time, it was $3.58 per ton on a 5-ton; $1.81 on a 10-ton truck; and $1.55 on a 14-ton truck.

We do deliver some ice 150 miles away from our plant. That costs $9.25 on a 5-ton truck, so we knew that was impossible. It was $4.69 on a 10-ton truck. But on a 14-ton truck the cost was $3.89.

Paper presented at Annual Ice Convention

Now, that necessitated these dealers in these areas getting more money for their ice. We also found that they couldn't handle block ice at those figures and come out and make a profit and stay in business.

We have farmers to whom we sell a lot of ice for corn icing. One farmer has 500 acres in corn. He would take 14 to 20 tons of ice a day. His price was the dock price plus cartage. Some are 50 miles away and some are 20.

We have an asparagus market near Bay City. That is a long distance to haul ice. But in other areas is grown the greatest proportion of rhubarb in the United States. These growers use ice in the Spring. After solving the delivery problem, we had no place to put the ice, so we bought vending houses, shells, without the belts or motors in them, and we put them in these areas where we could deliver and unload 18 tons of crushed, bags or block. The cost of those, depreciating them off in ten years, plus the power, runs about $25.00 a month, which is cheap, and most of the dealers or farmers buy this equipment, because they can save it in their cartage.

Cards Emphasize Safety

Then we gave our entire organization, every one of our superintendents, department heads, mechanics, a card to put on his windshield about saving money in delivery. If you take a 10-hour day and you save one minute out of every hour, it amounts to considerable before the year is out. On one truck, you save in a month 4 hours-10 minutes. On 10 trucks, saving one minute per hour, it amounts to 41 hours-40 minutes.

By following this same system with gasoline, etc., in spite of increased wages, in spite of increased cost of licenses, gasoline, parts, etc., we have been able to cut our cartage, with the highest labor rates in the last year, around eight percent, which we have been able to pass on and increase our business in the rural areas. It is not all rural, some are big towns.

Certain individuals have been in the ice business for many years, but they found it not too profitable, they were not too aggressive. We were in one town with a population of more than 30,000 that never had a cube or bag of crushed ice in it. We put a vending house there this year, sold the ice, delivered it to them, and the first month they sold 13 tons of cubes, the only time the people in that town had ever used ice cubes.

Many of those people have been to Detroit. It is a place where we have more vacations than any town in the world, paid vacations, according to the advertising people and other statistics, and they spread out and travel all over the state, with the lakes and the fine fishing and hunting, and in the summer time the population of a small area may increase by 12,000 or 14,000 people. They all buy ice if it is made available.

Selling on Honor System

We are now doing the same thing on ice for vegetables and peaches, and all these are in separate sections and some are local outfits. There is one dealer who put in a vending house, and he wanted it on the honor system. It worked very satisfactorily. This dealer had three little dealers working in other places. They bought the ice from him. He couldn't afford to have a man there. Each of the three dealers has a key to the place and they put down the amount of ice they take and each week they pay for it. It has been in operation now for four months and he said he is about $3.00 behind. He couldn't afford to hire a man at less than $10 a day, so that honor system is working well. He operates from an ice station, a "hot box" where he handles block ice.

Some days he sells as much as two tons to the consumer residents. It is no good in the winter time; there is nobody there. He has a box with a lock on and you drop your money. He will go in and check up in the morning and some days he may be short $2.00. The next day he may be $2.00 over. In other words, the people haven't the right change or haven't any money, so they take the ice and come back the next day and pay for it.

Practical Refrigerating Engineer

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

New Engineers Learn Dairy Refrigeration Uses

At San Francisco, California Chapter No. 1 has adopted a policy of having its active members give short, informative presentations on refrigeration uses in each particular member's industrial field. These talks of not more than 30 minutes, follow the regular instruction classes and question box sessions. The intention is to acquaint newer men entering the refrigeration field with its wide and varied uses, and to encourage the experienced practical man to develop his ability in writing and speaking. The paper presented here was among the first in San Francisco's unique educational program.

AN EPIDEMIC of fever developed on the Island of Malta many years ago that was a catastrophe, resulting in thousands of deaths. Investigation proved the cause of the epidemic was an organism in raw goats milk. The epidemic was stopped by training the inhabitants to boil the milk before using it. This epidemic was so severe that for many years, it was known as Maltese fever. Today we know it as undulant fever. Even today it occurs occasionally in this country in areas where there is no control over raw milk sales.

About 1915, California adopted the Department of Agriculture milk code. This code dealt with the processing and handling of milk and milk products. Prior to that, the purity and cleanliness of dairy products in the State were pretty much limited to the conscience of the distributor. True, some restrictions were imposed by the larger cities, but in most cases milk could contain many organisms that could result in tuberculosis, typhoid, and undulant fever.

Over 95 percent of milk consumed today is under control, and it is considered the most complete, nutritious and healthful food product that is available. There were two major developments that made this possible; No. 1, the development of the pasteurizing process (invented by Louis Pasteur about 1880); and, No. 2, rapid strides in the advancement of refrigeration.

From talk given November 10, 1954 before California Chapter No. 1, San Francisco, by Frank Cordoza, Refrigeration Engineer, Foremost Dairies, Inc. (Golden State Co. Ltd. Div.)

EXECUTIVE OFFICE NAPRE
433 N. Waller Ave.,
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Operating engineers of all refrigerating plants are invited to affiliate with the National Association of Practical Refrigerating Engineers, an educational association.

Sterilization

In recent years, a new process in the handling of milk has been developed. This new process is known as sterilization, and differs from pasteurization only to the extent of bacteria kill. In the pasteurization process, all pathological bacteria that can be harmful to humans are killed, whereas certain bacteria that generate acids and eventually cause the product to become unpalatable are not. In the sterilization process, the bacteria kill is complete, and the milk has a reasonably long life as a fresh product.

The differences in the two processes are in the temperatures used and the final method of containers. Sterilized processed milk must be canned in steril-cans which, of course, increases the cost. This product will be invaluable in places where there is a local milk shortage and no supply available within reasonable distance.

This is only a brief outline of the pasteurization process involved and what the process does. The actual handling of milk from the cow to the consumer is quite involved, and refrigeration plays one of the most important parts of this operation.

Starting at the farm, herds and barns are State inspected and must meet certain rigid standards before the milk can be used. This includes the reduction of the temperature of the milk soon after milking. This is usually over a surface cooler with "Freon" refrigerant.

Cooling Standards

The best answer to the question of cooling rate is found in what are known as "3-A Standards". These were established through the combined efforts of the three associations for which "3-A" stands: International Association of Milk and Food Sanitarians, Inc., United States Public Health Service, and the Dairy Industry Committee. The 3-A formula for cooling rates says (approximately) that, with a 1½ hour milking time, the first milking must be cooled in the tank to 50 F. within an hour after milking, and down to 40 at the end of the second hour after milking.

An eminent California authority recommends that the addition of later milkings must not raise the temperature above 60 F. Other authorities believe that 50 F. should be the limit.

A recent development has been the farm tank. These are small stainless steel tanks ranging from 200 — 1000 gal. capacity. They are also refrigerated by fluorinated hydrocarbon gases and are beautifully engineered, with sealed units, capillary tubes, air cooled condensers, etc. (see Fig. 1). The advantage of farm tanks is that milk can be held at reduced temperatures, making possible every other day pickup which results in considerable transportation saving.

After the raw milk arrives at the processing plant, it is stored in insulated and refrigerated tanks until processing, and if not processed immediately, it is again cooled. The process that the product goes through in the plant is quite involved, so this description will of necessity be brief. First, the product is put through a clarifier which removes all of the foreign matter, then standardized for cream and solids content. These operations, formerly by two

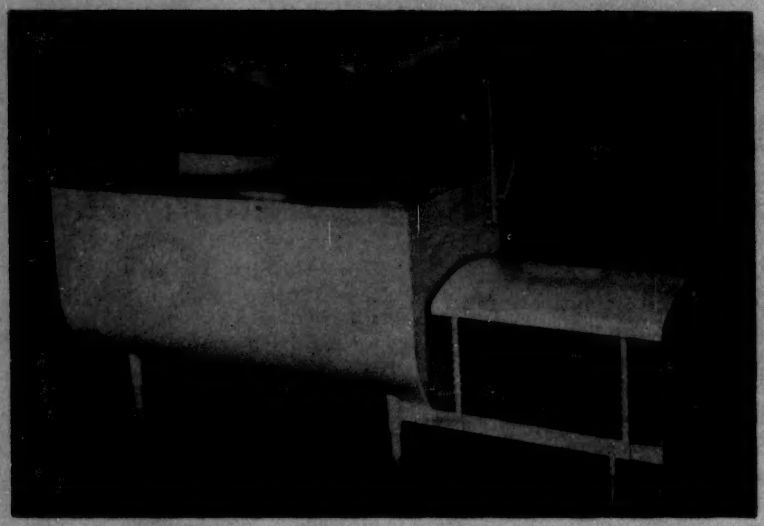

Fig. 1 — Farm milk tank. Milk is cooled and stored for pickup. Several milkings may be handled in one unit which has its own self-contained refrigeration plant. — Photo courtesy Creamery Package Mfg. Co.

Fig. 2 — Standardizing clarifier used in modern dairy plants performs both operations in single unit of equipment. — Photo courtesy DeLaval Separator Co.

pieces of equipment, are now performed by one machine (see Fig 2).

Pasteurizing Process

After standardizing, the milk is again stored in what are called surge tanks. From there it flows to the pasteurizer. Most pasteurizers in use today are known as High-Temperature Short-Time, or H.T.S.T. units. These machines are a complicated series of plates, usually consisting of

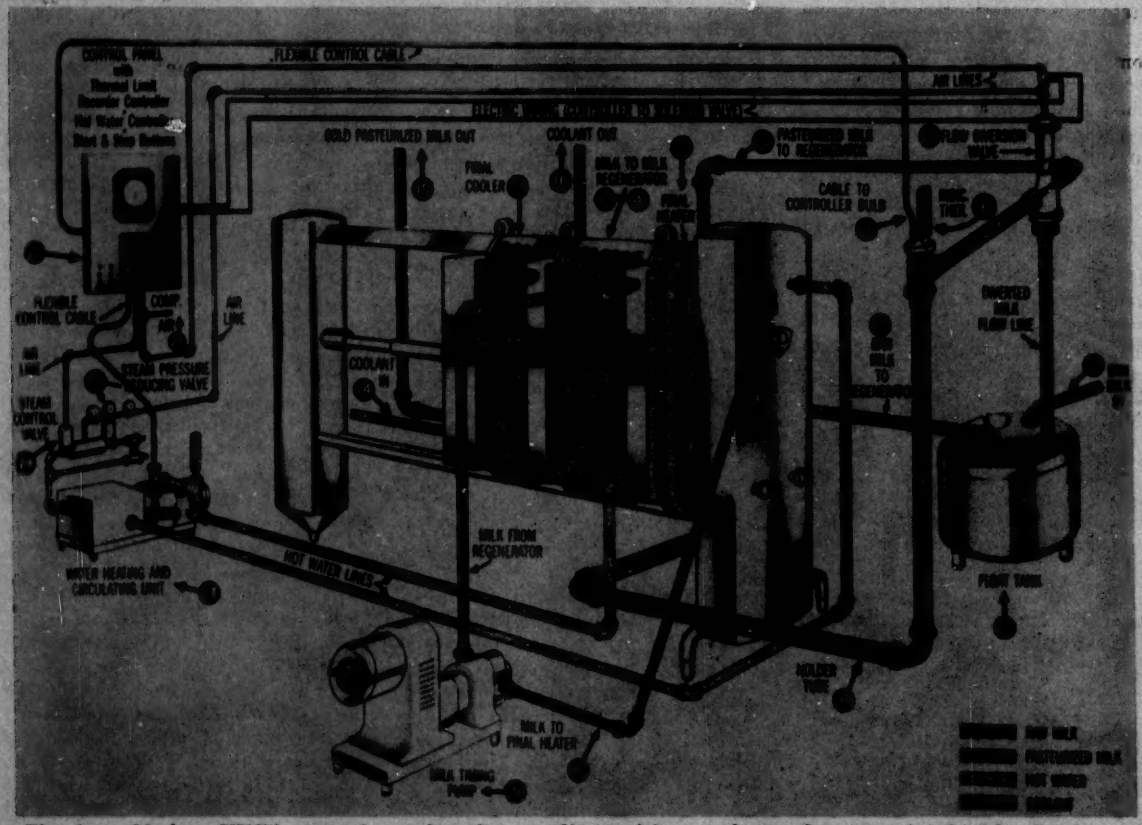

Fig. 3 — Modern HTST pasteurizer using three mediums of heat exchange; hot water for final heating (pasteurization), ice water for final cooling, and raw milk to pasteurized milk for initial heating and cooling, respectively. — Illustration, Courtesy Creamery Package Mfg. Co.

3 sections — heating, regenerating and cooling. They are made of thin stainless steel plates held firmly against each other by heavy stay bolts (refer to Fig. 3).

The process is one of rapid heat exchange. The raw cold milk enters the regenerating section on one side of the plates while the pasteurized milk leaving the heater section flows through the regenerator on the opposite side of the plate (notes 4 & 12, Fig. 3). Thus the hot pasteurized product is cooled and the cold raw product is pre-heated in this section, after which it flows into the heating section (note 7). Here the raw milk is then brought to pasteurizing temperature with hot water as the heating medium.

When the product has been brought up to pasteurizing temperature (usually 164 F.) it flows into a large holding tube (8) which is designed to hold the product at this elevated temperature until all the harmful bacteria have been killed, usually about 19 seconds. This holding time is not definite and is dependent on the pasteurizing temperature; the higher the temperature, the shorter time required for a complete kill, and vice versa.

After leaving the holding tube, the now pasteurized product again enters the regenerating section (12), where it is partially cooled by the incoming raw product, then on to the cooling section (13) where the cooling is completed. The cooling medium in this case is ice water which flows through alternate plates to the milk.

Post-Pasteurization

After the pasteurizing process, the product then flows to the bottling machines, and is sealed in glass or cartons which have been thoroughly sterilized. Then the milk is conveyed either to the store-room or directly to the trucks. In the latter case, it is either iced or loaded into refrigerated trucks.

An item of interest in this entire operation is that from the time the product leaves the cow until it enters the container, no metal except stainless steel is ever in contact with the product. The stainless is commonly known as 18-8 and must be ground to a No. 4 finish. (When the writer first became associated with the dairy industry, he once specified some work to have a No. 8 finish. All regular contractors refused to bid the job. Later it was learned that a No. 8 finish would be the same as used on metal mirrors. Needless to say, it was an embarassed but wiser engineer who revised the original specifications.)

In review, it should be remembered that responsible people in the dairy industry consider cleanliness, pasteurization and refrigeration the most important factors in the business. Without these three, it would be quite impossible to produce and deliver this fine wholesome food product.

As practical engineers, you are most interested in the refrigeration requirements. The desirable holding temperature for milk is considered 40 F. Development of bacteria that cause the eventual spoilage of milk are extremely slow below 40 F, moderate between 40 to 50 F, and rapid above 50 F. That is where refrigeration plays the important part of process, and the applications are varied.

As previously mentioned, the product is first cooled directly after milking, stored in refrigerated farm tanks, or refrigerated boxes on the farm until pickup. The modern method of pickup is in insulated tankers. After delivery to the processing plant, it is again cooled (unless it is to be immediately processed) and stored in refrigerated tanks until processing starts.

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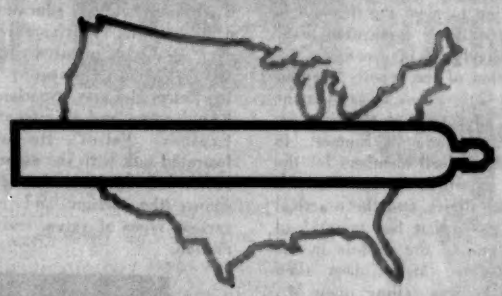

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Large Refrigeration Loads

Heaviest refrigeration requirements are during the pasteurizing process. It amounts to about 3½ tons of refrigeration for each 1000 lbs. of milk pasteurized per hour. As many of the modern H.T.S.T. pasteurizers operate up to 20,000 lbs. per hour, the refrigeration requirements become quite large. More refrigeration is required in the storage area, or in the truck.

Truck refrigeration has made rapid strides in the past few years and today is quite efficient and dependable. Perhaps one of the greatest single contributions to this dependability was the development of the pressure limiting expansion valve. Ice is still used to great extent in transport of milk, and in the small retail trucks still provides the cheapest and most efficient method of cooling.

News Notes and Chapter Activities

Los Angeles

FRED HERR

THE January 19 meeting of Los Angeles Chapter developed into an impromptu appreciation night for Emmett T. Quinn, long-time chapter treasurer, and watchdog of national finances for many years. The tribute to Quinn came after he had completed reading his annual treasurer's report which found the chapter in solid financial condition to meet the demand of the forthcoming national convention to be held in Los Angeles in November.

After completion of the report, National President Regis Gubser rose to say that he wished to take advantage of the occasion to express his gratitude to Emmett, in behalf of himself and all members for the superb manner in which he has watched over the financial affairs, and the practical advice he has given that has maintained the chapter as one of the leaders in the national organization. Mr. Gubser then announced that he was calling upon Mr. Quinn for further services to the NAPRE. He asked him to serve as chairman of a newly created Budget and Finance Committee which would survey the financial structure of the national organization, evaluate its fund-raising potentials, and provide the national officers with sound advice on all phases of money matters.

"Emmett Quinn's wise handling of finances for Los Angeles Chapter; and, his valuable advice not only on how to raise needed funds, but on which pitfalls to avoid, has kept this chapter in the black for many years," the National President said. "I know that he has contributed much time and work to the national association as treasurer for many years and then as its president, but I know of no other man who could head this new committee as well as he. He will have the privilege of selecting two members of his own choice to serve with him".

Mr. Quinn accepted the appointment for the duration of Gubser's term as national president. The membership rose in a spontaneous vote of thanks and appreciation for the many years of work he has devoted to NAPRE.

During the business session, President Elmer A. Johnson introduced Nick Skrabutenas, a Navy refrigeration machinist petty officer attached to the Hospital Ship, *USS Haven*, in Long Beach Harbor. Mr. Skrabutenas is a member of Chicago chapter. Mr. Johnson commented on the fact that the business session opened promptly with no stragglers hanging back to view final rounds of the prize fight on television. Thieves, he reported, had broken into the Terminal Club lounge the night before and stolen the TV set.

Technical talk at the Jan. 19 meeting was presented by Guy R. King, Instructor, Santa Monica Technical School, and vice-chairman, NAPRE educational committee. His subject, "Refrigerants — Old and New — Characteristics and Applications". On Febr. 2, the meeting was addressed by Peter McCarty, Sporlan Valve Co. on "Application and Maintenance of Thermal Expansion Valves". He presented an illustrated talk with the assistance of Walter Hilton of Sporlan, through which were shown the design and construction of various types of valves used in the refrigeration.

Emmett T. Quinn

By means of slides and accompanying commentary, Mr. McCarty explained how and why a valve may become defective, and how defects and inefficient operation may be eliminated. His talk was arranged to aid refrigeration engineers in operating refrigerant valves to their fullest potential.

Among the guests were five members of Alex Shears' refrigeration class at Los Angeles Trade Technical School, including Antonio Crusellas of Guauaquil, Ecuador. Senor Crusellas is studying American refrigeration techniques in California and will return to a job on the refrigeration staff of an Ecuadorian fish cannery.

New members accepted at the February 2 meeting were J. Patrick Kidd, Owens-Corning Fibreglas Corp.; Peter J. McCarty, Sporlan Valve Co.; and Hugh T. Shook, Young's Market Company.

St. Louis

BILL ALLEN

JANUARY meeting of the St. Louis Chapter consisted of a most informative field inspection trip to the recently augmented "Freon-11" air conditioning system of the First National Bank Building, St. Louis, Mo. The trip was made after a brief chapter meeting and some tasty refreshments in the bank's recently completed modern cafeteria.

President Stan Tatalovich and Henry H. Proemsey, chapter member and the bank's chief engineer, arranged for the inspection trip, as well as the presence of C. A. Mulholland, consulting engineer, Weil & Moses, designers of the system, and Messrs. H. Strange and J. Lavin of Kremer-Hicks, mechanical contractors, who installed the system. The recently completed portion of the system is a 400 ton centrifugal compressor unit which augments an original 350 ton unit installed several years ago.

Messrs. Mulholland, Strange and Chief Proemsey gave brief talks before the inspection trip, in which they focused attention on the principal features of the design and installation, respectively. During the trip J. Lavin elaborated on some of the installation problems. Chief Proemsey ably explained the centralized control in the engine room. An inspection was made of the interior of a zone fan, cooling, heating and filtering distribution chamber, which was typical for the various zones.

It was indicative that the chapter members, as well as the guests, were much interested in the application as a whole and will probably want more of such field inspection trips. The chapter, through its officers and Chief Proemsey, take this opportunity to thank the First National Bank for making this trip possible.

Rio Grande Valley

ARMIN DONEIS, SR.

VICE-PRESIDENT Dan Chapman, with the help of I. F. Boyd, Weslaco plant, Southern Texas Ice & Service, Inc. arranged a field trip for the chapter to the Weslaco Vacuum Chill Plant, Galveston Ice & Cold Storage Co. There we saw the Gayvac chilling retorts in operation for the chilling of head lettuce packed in paper cartons. These retorts are evacuated by two two-stage sliding vane type vacuum pumps. Ammonia compressors, evaporators and condensers serve to condense the water-vapor which flashes out of the lettuce or other leafy produce being chilled. All members and visitors present marvelled at the speed of the process, and at the ease with which the large fork-lift trucks trundled the pallets of stacked cartons off the field trucks and into the retorts.

After watching the process for several cycles, and inspecting the various pieces of equipment, we paid a visit to the neighboring ice plant run by Boyd. There we saw a model of neat housekeeping and machinery kept in shipshape condition. Thereafter, the group retired to a nearby cafe where Dan Chapman warmed us up with hot coffee.

Colton

HARRY BONTER

ELECTION of officers was held at the regular meeting on December 8, at the Santa Fe Ice Plant lunch room. They are: President, Carl G. Hooker, Pacific Fruit Express; 1st Vice-president, A. W. Franklin, Gold Buckle Orange Assn.; 2nd Vice-president, Julian E. Machut, Pacific Fruit Express; Secretary-treasurer, Harry O. Bonter, Pacific Fruit Express; Sgt.-at-Arms, J. E. Finfrock; Educational Instructor, Frank J. Scherer, National Ice & Cold Storage; Program Chairman, C. H. Purkiss, Pacific Fruit Express and Membership Committee Chairman, J. H. Mairs, Pacific Fruit Express.

Speakers for the evening were Regis Gubser, National President, who gave a detailed report on the convention held at New Orleans in November, and Lawrence H. Benedict of Los Angeles Chapter, who followed up with a very interesting sketch of the entertainment and tour activities of the delegates and friends. Mr. Benedict also entertained the group with a colored motion picture of his trip from Los Angeles to Chicago, then down to New Orleans, and various scenes in the city.

At our meeting of January 12, held at the Santa Fe Ice plant lunch room, San Bernardino, we had a very interesting guest speaker, A. S. Chantry. His very interesting talk was on various subjects concerning our major industries in this locality which utilize refrigeration. Frank Scherer took up his duties as class instructor, and also conducted round table discussions on various subjects of refrigeration and plant operation. The meeting closed with an enjoyable lunch.

Texas Coastal Bend

VERNON KUMMEL

OUR January 5 meeting was called to order by President R. A. O'Neill, who appointed a nominating committee to recommend officers for the coming year: Tom Campbell, Chairman, Frank Barton and J. E. Echols, members. Another committee composed of Dan Miller, Barney Majeskey and V. M. Kummel was appointed to make a report at our next meeting on a monetary gift to the Corpus Christi Engineers' Club as a token of our appreciation for the use of their facilities for our meetings. Arrangements have been made to hold our regular meetings on the 1st and 3rd Fridays of each month at the Club.

Our study course, under Dan Miller's leadership, took up the properties of the different refrigerants in Chapter III. Charts 3-1 and 3-2 were discussed and members were shown why certain refrigerants were not used commercially. Pres. O'Neill made the suggestion that at our next meeting we concentrate on the two most common refrigerants that most of us work with; ammonia and dichlorodifluoromethane.

At our January 21, meeting, Hank Wienold, district engineer, Gulf Oil Company, arranged the showing of a film on lubrication and care of bearings. Principal item of business was the election of officers. The nominating committee reported to Dave Brown, temporarily presiding, that the incumbents were its selection. Members present concurred unanimously by re-electing President, R. A. O'Neill; Vice-President, Dan Miller; Secy-Treas., V. M. Kummel; Sgt.-at-Arms, Herb Snyder, and Directors; Mrs. Loraine Fraser, Ed Campbell and Oscar Talley.

Yakima

ELMER TOOP

NEWLY elected and re-elected officers took up their duties at the first meeting in 1955, January 12: Arthur Krum, Pres.; Carl Casteel, Vice-Pres.; Galen Sutton, Recording Secy.; Elmer A. Toop, Financial Secy., and E. A. Wahlstrom, Sgt.-at-Arms. George Tilbury, consulting engineer, has again offered his services as instructor.

At our meetings lately we have been making plant tours. In December we looked over Perham Fruit Co.'s new plant at Tieton, Wash., which is reported to be of the latest design. It was engineered by Instructor Tilbury.

Our next tour was to Ellensburg to visit our charter member Oren E. Mann, who operates an apple box lid factory at Thorp, Wash., using quite a few of his own patents. Both these trips were very well attended.

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Tacoma

ELMER JOHNSON

AT THE meeting of January 5, the following officers were elected to serve the chapter in 1955: John Moyer, Pres., James Bennett, Vice-Pres., and C. W. E. Johnson, Secy-Treas. Committees are headed up thus: Phil Gilmore, Ch., Education, with Archie Waterbury as Asst.; Wayne Vanderflute, Membership; Jack Bunt and W. Owens, Delinquents; James Bennett, Clarence Mase and Louis Johnson, Social; and Wayne Vanderflute, Jim Bennett and Jack Bunt, Auditing Com.

Wayne Vanderflute reported that the committee had audited the books and found them correct. Archie Waterbury reported progress in regards to the proposed City Ordinance, licensing Refrigerating Engineers.

John Overstreet was asked to tell the group about his experiences in Saudi Arabia; John complied and gave a very interesting talk. He stated that the average life of an automobile there is about three years, because of the terrific sand storms. Strangely enough the white personnel seem to stand the heat better than the natives. The fairways on the golf courses are sand, and the greens are made of black top. (Los Angeles brothers, please take note!)

Mr. Overstreet, who works in Dhahran, Saudi Arabia for The Arabian-American Oil Co., as a refrigeration engineer, commented: "My work consists of operating the ice plant which has had a capacity of 15 tons a day, and which at the present time we are enlarging to 20 ton capacity.

"I also operate and maintain the commissary refrigerating cold storage plant which consists of a 2-stage plant with direct and indirect systems. We also have direct expansion for the sharp freeze rooms. Foods valued at between two and

John Overstreet

three million dollars are stored here, where temperatures are maintained from 35 to minus 35 F. We also maintain cool rooms for dry storage at around 60 F.

"Our outside temperatures in Dhahran run from around 125 during the summer months to about 75 in the winter. All the operators, helpers, and defrosters are native Arabs and do a good job with a minimum of supervision."

Chicago

BILL O'REILLY

ILLINOIS BELL Telephone Co. was host to Chicago Chapter at its first meeting of 1955. Members toured communications plant, test and traffic centers in the Stewart Office on W. 76th St., before inspecting the refrigerating equipment and air conditioning systems. First treat of the evening was at the cafeteria where all guests enjoyed dessert of ice cream and cake, and coffee.

Commercial representative, V. Price, Ill. Bell, started the activity by introducing H. S. Smith and S. E. Gale of the Plant Dept. and three ladies of the Traffic Dept. A very complete tour of the communications system followed and members were shown how this exchange was able to handle 67,000 telephones of seven exchanges; saw long distance and local toll operators at work, the communications equipment room and stand-by power equipment.

The group then assembled in the conference room and were given a talk on the air conditioning system by W. L. Warnstedt, Supt., Bldg. Maint. He explained that the equipment is primarily for humidity and temperature control requirements of the exchange equipment, and not for comfort of personnel. Humidity limits of 40-55 percent, winter minimum and summer maximum, respectively must be maintained, it was explained. Relays with as many as 65 contacts to a unit, with gap tolerance in tens-of-thousandths of an inch, although having potentials of 24 and 48 volts and milli-amp currents, often weld over or arc through the air gap when humidities are too high. With improper temperatures (76-78 F are most desirable) and low humidities, equipment becomes maladjusted and will not function.

An opportunity to inspect the 225 ton York centrifugal compressor installation followed. This installation operates at 6-7 lb. discharge with 38 F condensing and 15-17 inch (vac) suction, to chill water to 43 F for the air conditioning system. Plenums and filter arrangements with various alarms attracted the greatest interest.

Automatic controls regulated dampers admitting from 100 down to 30 percent fresh air to the supply plenum. Return air entered same plenum from above. From that point the air passed through glass fiber filters to a tempering coil. It was explained that this coil was principally in use during sub- and near-zero F weather.

Pre-heated (tempered) air is then passed through electro-static (automatic oil-bath cleaned) filters, of 13,000 volt ionizing type. (Dust and impurities are as much enemies of the telephone automatic plants as high humidities and temperatures). This twice-filtered air is then heated (steam-coil) and passes to a third filter, a woven-strip felt type.

Each filter is equipped with manometers, and diligent observations are made by maintenance personnel, daily, to assure ultra-clean air supply to automatic phone equipment. From the third filter the air passes over a water spray type chilled water coil, then through eliminators and fans, and a reheat or tempering coil again, and thence into the system.

Protection is elaborate. A central office alarm system shuts down all rotating equipment in event of fire or smoke. Smoke alarms of photo-electric eye are in both supply and return systems. Temperature devices for detecting excessive heat (fire) are also in supply and return ducts. A sprinkler alarm is used in connection with the electro-static filter. A "freeze" alarm is installed in the supply air system and set at 40 F. Alarms on alarms, all to protect elaborate and expensive equipment for phone users' convenience and fast service.

On January 25, Dick Zach, York Corp., was our instructor for the evening. He continued on vessels and flow equipment, where we left off at the meeting of December 14, 1954. A general discussion followed on receivers, condensers, filters, strainers and oil traps, with blackboard illustrations, and each one's operation and purpose.

Our regular meeting was brought to order by President Art Clementson. There were four new applications; one for reinstatement: Clarence and Ray H. Wentink, Andrew L. Loussaert, and Frank J. Hunka. Chas. Winklemann re-instated. Bert McKenna gave a preview of what to expect at the regional meeting, Congress Hotel, April 30 & May 1, 1955.

Chapter Vice-President and Educational Chairman, Nick Downes, Ill. Bell Tel. Co., introduced D. A. Forberg, Air Comfort Corp., Mike Goddard, Maintenance Supervisor, Carrier Corp., and Ted Grey, Sales Division, Temperature Equipment Co. Goddard, a member, gave a very fine talk on high speed compressors, and the maintenance of these machines. Members were shown by means of slides, the many parts of the compressor and the dismantling of same. After the talk and slides, members asked questions which were answered.

Seattle

JOHN GRAINGER

AT THE regular meeting, January 20, Bob Harrison, the chapter instructor, gave a half hour in the basic principles of refrigeration, starting with heat; covering the definition, kinds of, and the practical application of heat, such as heat to be extracted, which results in the standard ton refrigerating measurement.

Art True, an electrical engineer, Westinghouse Corp. showed slides of "Motors and Controls, De-Mystified". This is part of the technical education given the staff of Westinghouse and consisted of eleven questions and answers. Discussion followed the showing. One question and answer seems worthy of note. Q: Will a synchronous motor take up thrust? Ans.: No, a synchronous motor does not take up thrust —although it does tend to centralize itself while running, but actual thrust must be taken up in a mechanical manner. A synchronous motor may be pulled out of line by faulty thrust alignment, but on stopping will come back into line again due to this centralizing effect.

Members-at-Large

BERT C. MCKENNA

INDUSTRIES represented by Members-at-large are as varied as this correspondent has found among the chapters. Some of the oldest industries to use refrigeration, like brewing and ice making are included, and some of the newest industries to apply refrigeration like pharmacal houses and laboratories. It is not the purpose of this column to cite any statistics but it may be of interest to our members to learn more about engineers in this category and where they are employed. Recently we heard from Daniel T. O'Neil, supervising engineer, Narragansett Brewing Co., Cranston, R. I.; N. W. Day, president of his own supply company in Hartford, Conn. Benjamin Deliso, superintendent, Pioneer Valley Refrigerated Warehouse, Springfield, Mass., not only came to our attention through the mails recently, but visited Chicago in person for the NARW educational conference at the Edgewater Beach hotel, January 10-13.

Russell Foster of Lynbrook, N. Y., is air conditioning mechanic for Sperry Gyroscope Co. Sperry's laboratory was pictured on the front cover of the February issue of IR. Members can get an idea from that of the equipment which Foster maintains in addition to his air conditioning responsibility.

Three members recently heard from in New York City have responsibilities closely akin, but are employed by three industries with not too much in common. They are Eddie M. Nelson who is chief engineer, Peoples Realty Co., in Astor Place; R. O. Tanner, stationary engineer for Lincoln Hospital and Martin L. Schermer, custodian engineer for New York City Board of Education.

Hygeia Engineers

One firm, Hygeia Refrigerating Co., Elmira, New York, boasts of 8 members. These engineers are W. C. Wolgast, secretary and superintendent; William Murphy, chief engineer; Robert Comfort, assistant chief engineer; Stephen Greatsinger, Alfred Tillsley and James Lewis, operators; and John Ring, and LaVerne Knowlden, relief engineers.

John Pondish of Union City, N. J., has taken a military membership card, having been drafted into the armed services of our country on January 4. Best wishes from all of us John, and we'll look forward to having you back in the refrigeration game on completion of your service tour. Another member at Union City is Oliver W. Calloway, design engineer for Tenney Engineering, Inc. Other New Jersey members are Hubert Hooper, engineer Merchants Refrigerating Co., Nutley; George C. Schneider, plant superintendent, Glassboro Cold Storage; Alexander C. Speer, factory engineer, Western Electric Company, Kearney; and, W. Warren Wilson, vice-president, Camden Refrigerating and Terminal Co. that city.

An associate member with Henry Bower Chemical Company in Philadelphia is R. G. Hassell, sales manager. Another Pennsylvanian is Matthew F. Nieder, refrigeration service engineer with Caumeng Corp., Altoona. Over in Ohio one of our members, recently retired, reports that he cannot stay away from the game and has been taking part-time operating engineering duties with the City of Columbus. He is Walter J. Mikker, retired from Telling Ice Cream Company in 1954. At Dayton, Ohio we recently heard from L. O. Warner, president of the refrigerating firm by the same name.

Even the meat industry is represented in the person of Wm. L. Morris, engineer for Canton Provision Co. At Toledo, NAPRE is represented by Wm. C. Ludwig, division superintendent, City Products Corp. Although we have a first-class chapter in Detroit, Michigan, No. 1, we have two members a little remote in that group. They are William C. Rehor, service promotion engineer wth Carrier Corp., who makes his home at Albion, and Lawrence J. Dooling, chief engineer for Bay City Freezers, Inc. Incidentally NAPRE's educational chairman, Erich B. Utescher, appointed Larry on his publication committee for 1955. Down in Indiana Paul F. Northam, assistant power engineer, Miles Laboratories, Inc., was recently heard from, as was Louis E. Beach, chief engineer of

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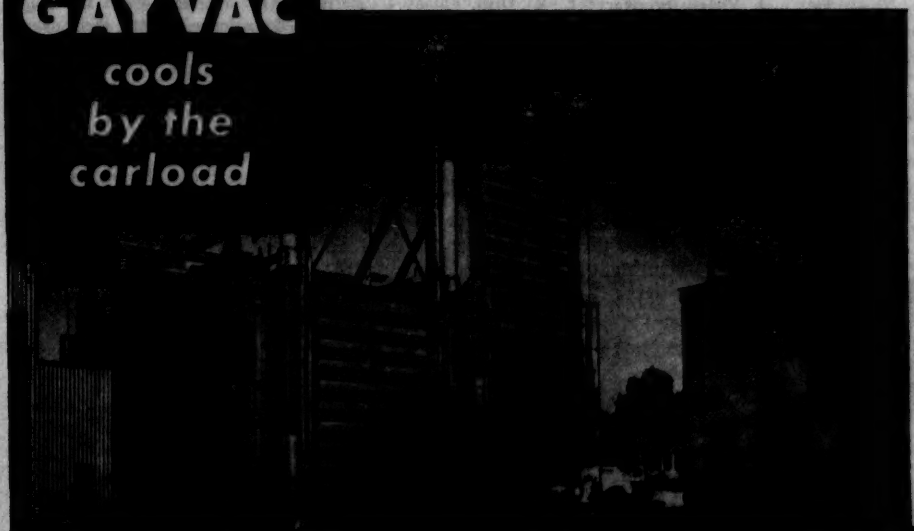

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GAY ENGINEERING CORPORATION

Evansville Ice & Storage Company. We sincerely hope that these Indiana neighbors to Chicago chapter will have an opportunity to attend the Educational Conference, April 30-May 1.

Canadian Members

Bob Heartwell, treasurer and engineer, Sarnia Ice Co., Ontario, is again active on the membership committee of NAPRE. Bob has plenty of company up there in Canada, although the membership is widely scattered from his place of operations. John A. Kennedy is manager of the John A. Kennedy Co., at St. John, New Brunswick, and A. W. Burnip is chief engineer, Northern Fishermen's Cold Storage, Ltd. Prince Rupert, British Columbia.

Also in British Columbia at Vancouver is member Ernest W. Saunders, chief engineer, Royal Ice & Cold Storage Co., and E. A. Cruise, assistant manager, Vancouver Ice & Cold Storage, Inc. In Alberta, we have William Gomany, assistant operating engineer with Broder Canning Co. Ltd., and at Montreal, S. Houle, manager of J. A. Thibault, Ltd.

In Alaska, Allen A. Lowrance and Frank D. Montgomery are employed by the same firm, Sitka Cold Storage; both as chief engineers, but one at Sitka and the other at Juneau. For comparison in climate, we also heard from Cameron W. Deal, refrigeration mechanic at the Marine Corps Air Station, Lanikai, Hawaii. From abroad we received an annual remittance from Robert Finlay, engineer with Wm. Milne Ltd., Glasgow, Scotland. From Habana, Cuba came correspondence from Francisco Fernandez, service engineer and Rolando A. Diaz, vice-president and electrical engineer, both with Wm. Anderson Trading Company. Jorge Rascon, engineer in Mexico also corresponds, and a very nice Christmas card was received from Ricardo Redlich which reads as follows: "FELICES PASCUAS yun PROSPERO AÑO 1955. Desea a Ud. y a todos los Miembros de su organizacion, CASA TEDORO HARTH, S.A., Lima, Peru, Diciembre 1954"

Every year at this time our routine invoicing of members in this category brings to light a few losses. Our first loss reported was that of active member Leslie G. Maness. He died at Gresham, Oregon at his home on August 27, 1954 after several months illness due to lung cancer. He was born at Stella, Mo., February 9, 1898 and received his schooling in Missouri and Oklahoma. He is survived by his widow, Esther, his daughter, Patricia Bengston, his mother, Mrs. Julia Maness, and two brothers and three sisters. He was assistant chief engineer for Northwestern Ice and Cold Storage Co. of Portland, Oregon. He was a member of the Masonic Lodge.

New Orleans

LEO VIVIEN

LOUISIANA Chapter No. 2 started 1955 in a most active and pleasant manner on January 12. The chapter installed its officers with the wives and sweethearts as guests. The entertainment committee, under the leadership of Jerry Vieages, made sure that ample food, refreshments, music and entertainment were available. Over 200 members and their ladies had a grand time.

The regular order of business prevailed for about a half hour. During this period President Frank Chase delivered his report to the chapter, and various officers and committeemen reported on their activities during the past year. William J. Williams, past president, was the installing officer, and after delivering a brief biography of each officer, he seated them. He then administered the pledge of service to the elected officials.

The newly elected and installed officers for 1955 are: M. D. Mancuso, president; D. Fischer, V. Foret and M. Sofer, vice-presidents; G. J. Whitman, treasurer; L. J. Vivien, Secretary; E. W. Orth, Financial Secretary; J. Arena, Sgt-at-Arms; M. G. Olivier, educational chairman; F. Chase, board chairman; and C. Bosse, J. Mariakis, F. Gillio, J. E. McConnon and J. Vernaci, directors.

President Milton Mancuso addressed the gathering and named the following committee chairmen: Finance, B. Mancuso; Publicity, M. Sofer; Membership, J. Chaisson; Entertainment, G. Vieagas; Publications, J. Mariakis, Sr., and Building, A. E. Wegener.

Past President Tom O'Connor presented Frank Chase, retiring president, and John Luck, class instructor, with a gift in behalf of the chapter, signifying appreciation of their services. General dancing and other frivolities followed.

At the meeting January 26, President Mancuso outlined some of his ambitions for the coming year. Educational Chairman, M. Olivier, presented Walter H. Zillessen, Jr., a Bostonian by birth, graduate of Brown University, and Sales Representative of the E. I. Du Pont De Nemours and Company, Kinetic Chemical Division, as the lecturer of the evening. Mr. Zillessen presented their Road Show and gave an illustrated lecture on "Freon 22", its application to refrigeration, air conditioning and low temperature commercial equipment, its uses in general and future uses.

San Francisco

DICK KELAHAN

MEMBERS of this chapter have made the speaker's limelight in local power engineer circles. On Friday, February 11, Henry A. Guilmette, Pacific Scientific Co., vice-president (and acting secretary), lectured to California No. 1 Chapter, NAPE, on "Temperature Control." A week later, Lewis P. M. Brooks, Carrier Corp., spoke to the power boys on large refrigeration and air conditioning units. It was significant to note NAPE's program committee comments that members "may be called on to operate an air conditioning plant one of these days."

Memphis

CHAS. CONLEY

CHAPTER instructor, H. L. Todd, talked on locker plants, their operation and value to the community in which they are located at the meeting, Wednesday, January 19. He indicated the various services they render to their customers and how they have grown in some locations as to others. He said the home freezers had cut into the locker plant business since most all farmers and a good many town folks have their own freezers.

Past-President Tom O'Connor presents John Luck (left), New Orleans Instructor, and Frank Chase (right), retiring president, with tokens of esteem.

Members and guests at Louisiana Chapter's installation of officers and other ceremonies wound up with a dance Wednesday evening January 12. The New Orleans Chapter usually opens each season with such a party

Changes in Shell Egg Standards and Grading

CHANGES in the quality standards and weight classes for shell eggs have been announced by the U. S. Department of Agriculture. A proposal to make these changes was issued by the Department on November 22, 1954. Most of the changes go into effect March 1, 1955. Changes in weight classes and facility and operating requirements will become effective January 1, 1956.

The principal change in the standards eliminates "stained" eggs as a separate quality classification, and includes eggs with stained or soiled shells in "B", "C", and "Dirty" qualities, depending on the intensity and area of the stain.

The weight classes of the various grades (consumer, procurement, and wholesale) will be changed to effect more uniformity between the respective grades and within the weight or size classes. "Large" eggs must weigh individually at the rate of at least 24 ounces per dozen and there will be a uniform spread of three ounces per dozen between each of the weight classes such as "Extra Large," "Large," "Medium," and "Small." In all weight classes there will be a tolerance of five percent for eggs of the next lower weight class.

The regulations applicable to the voluntary Federal-State egg grading service and the standards, grades, and weight classes for shell eggs have been combined into a single document. The revision of the regulations (1) establishes requirements for facilities and operating procedures with respect to the grading and packing of shell eggs that are to bear the official grade marks, (2) prescribes the form of the grade mark, and (3) makes minor changes in some of the other provisions consistent with similar provisions in the poultry grading and inspection programs.

Frozen Cake Batters Best At Minus 20 F

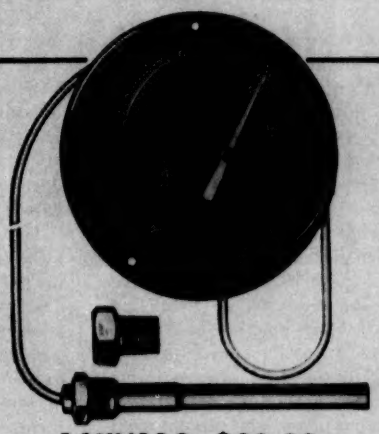
FOOD RESEARCH recently reported on a manuscript covering tests conducted at the University of Tennessee, concerning the effects of freezer storage temperatures on cake quality and CO_2 content of cake batters. The research reported in the paper had been done in the University Agricultural Experiment Station and College of Home Economics by Ruth Moore, Bernadine Meyer and Ruth Buckley, in 1954.

Previous investigators had been concerned with keeping quality of frozen cake batters. Reports to date indicate that keeping quality factors are influenced by freezer storage temperature and ingredients used, particularly the type of baking powder. The Knoxville Researchers reported that there were no marked variations in cake quality using different types of baking powder, under the same storage conditions. Quality and volume of cakes baked from frozen batter showed no noticeable deterioration during 12 weeks storage at minus 20 F.

Deterioration took place in cakes baked from batters containing each type baking powder stored at 0 F, in a period of anywhere from 2 to 4 weeks. Even greater losses occurred when batters were stored at 0 F, rather than the preferred minus 20 F. The report cited quality deterioration parallel to carbon dioxide losses.

Phosphate, sulfate-phosphate and tartrate baking powders were tested in four series of shortened cake batters after 2, 4, 8 and 12 weeks of freezer storage under 3 separate conditions. Batter storage conditions were: frozen and stored at minus 20 F; frozen at minus 20 F and stored at 0 F, and frozen and stored at 0 F.

It's easy to read this honest face



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It's available in a variety of standard dial ranges from minus 40 to +120°F. There's a choice of four forms of bulb and connection, and the bulb and well material can also be selected to fit the application.

Some features of its construction include: pressed metal case—base diameter 6½"; bushed bearing movement, with wide surfaces on pinion and sector for minimum wear; 5" black metal scale with large figures and graduations, making it easy to read from a considerable distance; five feet of ⅛" diameter copper tubing as standard equipment. (Longer lengths available at slight extra cost).

Ask your Taylor Field Engineer for information about indicating, recording and controlling instruments designed to meet the demands of modern refrigeration, or write for **Catalog 300 JR.** Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada.

Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.

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From the President's Desk

Membership Drive Picks Up Momentum
April Dues Deadline; First Memorial Gifts

MEMBERSHIP each year experiences a post-convention surge, then a first-of-the-year lag, and now with the advent of Spring seems to enjoy a re-surgence. Many members may be interested in the fact that during the last quarter of 1954 we interested 156 engineers into becoming active members of NAPRE. Surprisingly, a smaller part of that number may be attributed to our pre-convention activity which usually closes the membership contest.

It may have been expected that New Orleans and Los Angeles would lead in the number of new members obtained during the last quarter of 1954. However, it was totally unexpected that Chicago and Tacoma, Washington, would be in there contesting these two large chapters' leadership. That should convince some of the smaller chapters that large groups of new members is not reserved to the big boys.

Currently our membership efforts are directed to the enrollment of engineers in the cold storage industry. This is in keeping with the 2-year national plans. The present drive of the refrigerated warehouse industry ends with the month of April. In mid-month we will begin focusing our attention on membership prospects in public buildings with emphasis on the engineers and maintenance personnel responsible for air conditioning plants.

Bill Orton, our National Membership Chairman, advises that early in the year our national office supplied all chapters and national committeemen with new applications. These new applications are white rather than colored; the principal difference being that an $8.00 initiation fee is now required.

Your national committee has been supplying chapters in each region with leads during each phase of the national membership drive. When the chapters receive a lead, they can be assured that the management of the firm where their prospect is employed has been canvassed by a letter over the National President's signature. Further, a few days later the engineering personnel all received letters from the National Membership Chairman. This sets the stage for a chapter follow-up.

Considering the work that the national committee has put into publicizing the membership drive within each industry, it is the chapter's duty to follow-up promptly. It is suggested that you invite the engineers contacted to your meetings. Give the gentlemen a '54 Operating Data Book or a recent issue of Industrial Refrigeration, containing information of value to him in his work. These Data Books and IR's are replaceable. If the supply for your chapter is low, write the national office for more.

Use the recent literature furnished to you for this drive. Also use it for other prospects in your locality. The two articles by the late Professor H. G. Venemann, "Mr. Manager . . ." and "NAPRE'S Place in the Industry" are excellent pieces of literature to circulate to management. The blue "Services" brochure is excellent public relations material for both management and the engineering department. Use that literature and the above suggestions to sign up those prospects, and by all means make it a personal call to close the deal.

Prize Members

NAPRE is fortunate in having a great number of members who are very prompt in the remittance of their financial obligations. Due to the work load of your national and local officers, it would be impossible to acknowledge each remittance individually. For that reason standard forms are used and the matter becomes very impersonal.

However, as your National President, I would like to take this opportunity to thank those members who are so prompt with their dues. Your consideration relieves the burden of your chapter secretary-treasurer and national headquarters. NAPRE's best interests are served when one invoice brings in a man's dues. When a second or third invoice is required, it reduces local and national time and effort that could otherwise be spent on other services in behalf of the membership. *It is a pleasure then to salute those early birds in our organization. You are our prize members.*

To those who overlooked, misplaced or forgot to remember, please get your dues in by April 1. Don't miss receiving your regular monthly issues of Industrial Refrigeration.

Venemann Memorial

First honorary member appointment to the Venemann Memorial Educational Committee is Mrs. H. Gerald Venemann, widow of our late beloved Educational Chairman. Inspiration for this project came as a result of her suggestion. Due to her close association with many of the late Professor's projects, and because she has had some experience with these sort of funds, as well as having access to expert counseling on such matters, your president feels that Mrs. Venemann will be a very helpful and influential member of this national committee.

Another "first" in connection with the Venemann Memorial, is the first contribution from the refrigeration industry. It is a pleasure to quote from correspondence received from Nickerson & Collins Co. over the signature of H. T. McDermott, President: "The NAPRE is to be commended for the establishment of the NAPRE Venemann Memorial Educational Fund as a living memorial to the late Professor Venemann.

"This practical testimonial in providing for the education of deserving young men is a fitting tribute to an individual who contributed so much to the practical and scientific advancement of the refrigeration industry, and whose willingness to assist in the advancement of his fellow man is widely acknowledged.

"Therefore, the publishers of the NAPRE's official organ, 'Industrial Refrigeration', consider it a privilege to be among the first contributors to the fund, and accordingly attach check for this purpose."

Our thanks to Nickerson & Collins Co., and to those other firms and chapters who have responded so quickly to the announcement, regarding the NAPRE Educational Fund. Although it is the policy of the Association not to list or publish specific amounts or names, we do believe it is in order to announce that the first chapter to respond was Tacoma, Washington Chapter No. 2.

Regis Gerber

Warehousemen Meet in Chicago

THE American Warehousemen's Association will hold its 64th annual meeting at the Edgewater Beach Hotel, Chicago, Ill., April 12-16, 1955, says an announcement from A. B. Efroymson, Cleveland, general president of the AWA. Over 800 refrigerated and merchandise warehousemen from all sections of the nation are expected to attend the four-day meeting. Meeting jointly will be AWA's two divisions—the National Association of Refrigerated Warehouses and the AWA Merchandise Division.

The program will include individual divisional business sessions, with the refrigerated warehouse sessions under the chairmanship of M. W. Young, NARW president, San Francisco, Calif.

A feature of the meeting will be two All Industry sessions, attended by members of both divisions. On Thursday, April 14, the Merchandise Division will sponsor a session and exhibit on office machines and procedures. On Friday, April 15, NARW will sponsor a session and exhibit on man hour production.

Registration for the convention will begin on Tuesday, April 12. The traditional divisional "First Timers' Breakfast" will take place at 8 A.M. Wednesday, April 13, followed by the opening divisional business sessions at 9:30 A.M. and the Opening General Session Luncheon at noon. The AWA President's Reception and Banquet will be held on Friday, April 15, and the Farewell Luncheon at noon on Saturday, April 16. General Convention Chairman is E. G. Erickson, of Chicago.

Packaging Materials and Condensation

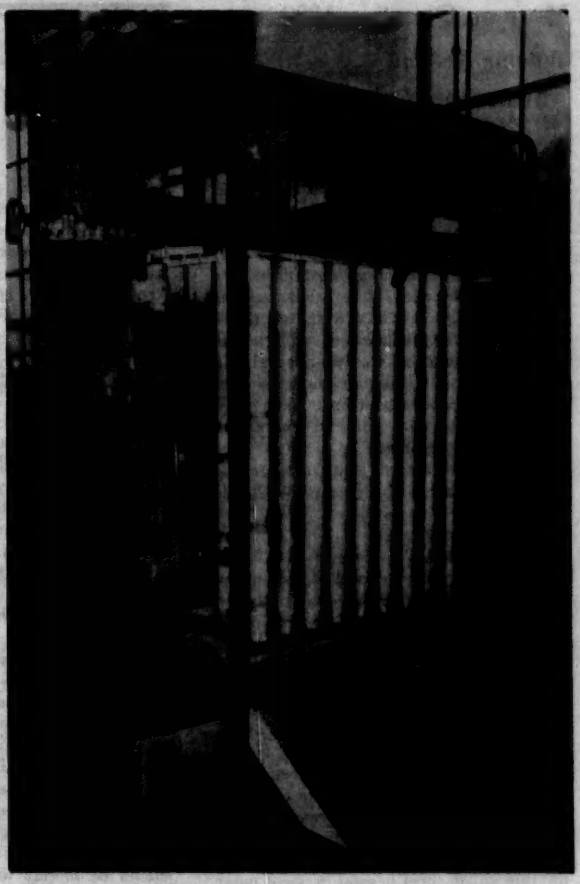
EXPERIENCE in the candy storage products at Georgia Experiment Station under Dr. J. G. Woodroof's guidance brings out some facts regarding relations of wrappers to condensation-sweating on removal from low temperature that may have much wider significance.

Boxes of chocolate-coated assorted candies removed from 35 and 0 F to room temperature did not sweat, provided they were wrapped in certain materials. Aluminum foil collected more condensate than other wraps and protected more moisture but dried faster. This property of wrapping material may be very important. In this respect saran and polyethylene were good performers also, though they collected less moisture than foil. The cellophane performed well but wrinkled and shrank noticeably after the moisture had evaporated.

In the removal of goods from low to room temperature, the moisture problem must be met and solved. Gradual tempering is slow, and perhaps packaging materials will help solve the problem. Dr. Woodroof's studies are aided by TRRF under Project No. 45.—TRRF Information Bulletin.

Irradiation of Pork

IN ITSELF, irradiation of pork carcasses to kill trichinae is not a difficult problem and is under consideration. At the University of Michigan (Ann Arbor), H. J. Gomberg and co-workers, have undertaken an estimate of cost, published in Nucleonics for September 1954. In a plant that would irradiate 2,000 hogs per day, 260 days per year, the operating cost with 10-year amortization would be 29 cents per hog. Essentially, the plant would consist of a heavily walled series of passageways through which carcasses could be conducted past a source of irradiation contained in a suspended plaque. When workers are in the enclosure, the plaque would be lowered into a tank of water.—TRRF Information Bulletin.



Harvest New Profits with a FRICK SHELL-ICE MAKER

Ideal for dairies, fisheries, poultry and vegetable packing houses, hotels, institutions, industrial plants, etc. Shell-Ice is frozen on vertical tubes by direct-expansion ammonia or Freon, in thicknesses of 1/8" to 1/2", and is broken by spinners to size desired. No snow, scrapings or waste: no scale, no cleaning. Shell-Ice is dry and hard, and with average good water is clear. This ice-maker is fast, efficient and automatic. All-steel construction: no delicate parts. Requires very small floor space. Sizes 1/2 to 40 tons capacity. Dozens already in service. Write for Bulletin 54.

FRICK CO.

More on Question 1032

Bulging Ice-Cans

QUESTION NO. 1032. Thank you for your answer regarding crankcase regulators which I sent in some time back. Now I have another!

We have a 20-ton ice tank here with brine as the secondary refrigerant and ammonia the primary. The brine is continuously circulated through the evaporator and kept in agitation. We freeze the water in 300-lb cakes, in cans approximately 1 x 2 x 5 ft., at 15 F.

Some of the cans have swollen due to the expansion of ice and are bulging out about the middle of the two foot side. What causes this? We have operated this plant for ten years and this is the first time.

What is the proper way of painting and maintaining these cans?—C. B., Alaska.

ANSWER NO. 2: Cause of swelling of ice cans on the broad side is meltage of ice and re-freezing of the water. Whether the ice bar is solid or still has a liquid core, it will float upward in a very small quantity of meltate, perhaps a quart, or less. When this meltate refreezes, it exerts powerful pressure on the can walls. This pressure is greatest at the bottom of the can, where the metal, due to the staying strength of the riveted bottom, is strongest. Generally, however, the pressure of expansion when the meltate refreezes works up a foot or two from the bottom, where the metal is much weaker, and there distends the thin gauge sheet beyond its yield point. The resulting bulging of the can requires excessive meltage to get the ice bar out. There is a loss of ice and longer time is needed for the harvest.

Melting of the ice about the can walls certainly is caused by high brine temperature (probably well above 32 degrees Fahrenheit) although 1 degree above this freezing point, if maintained for any length of time, would be just as dangerous. This could have happened to the whole of the brine at a time when a high percentage of the field was harvested within a short period, or when for any reason the compressor was idle. Or, it may have occurred at a blind spot in tank which contains no pipe coils, but in which the brine is circulated after passing thru or over an outside evaporator, or brine cooler.

Suggests Derangements

A baffle which has been wrongly placed, or broken, may permit several cans of warm water to raise the temperature of surrounding stagnant brine well above the temperature shown on the tank thermometer. Or, the thermometer itself may be in error. A clogged screen near an agitator is also a cause of poor brine circulation. C. B. should examine his baffles, and also test every part of the brine tank by lowering a portable thermometer between the cans. This last should be done 15 to 30 minutes after a harvest, thus allowing time for the brine to cool the water in the cans and the water to warm up the brine. If ice making water is warm, it should be pre-cooled before putting it into the cans.

Poor circulation of brine may be determined by the fact that a can of water in one part of the tank does not begin to form ice as quickly as a can in another part of the tank. Also, the core will be found to be larger at the time cores are drawn. Testing by thermometer immediately and for a short time after the can is lowered into the brine will show a slower temperature drop.

Procedure for proper maintenance of ice cans depends upon whether the cans are new and fully galvanized, or have lost this protective coating. Brine never should be allowed to become acid. A test set should show mildly alkaline (7.5 to 9.0) for zinc coated cans and slightly greater alkalinity (9.0 to 10.5) for rusty cans. Rusty cans should be thoroly wire-brushed, dried and painted with a good marine primer. This is for exterior use only. Corrosion inside the cans is harder to combat, since the ice bar often rubs off the coating as it slides out. When using an alkali to reduce brine acidity, care should be exercised in use of the additive, as excess alkalinity, like acidity, will burn off the zinc coating of new cans.—O. LeB, Oroville, Wash.

NAPRE

Question Box

The National Educational Committee, NAPRE, answers monthly in this column, operating problems forwarded by members. The Committee appreciates answers from the field. Address questions and answers to Prof. Harold P. Hayes, Dean of Engineering, State Polytechnic College, San Luis Obispo, Calif.

Efficient Method Sought For Cleaning Air Filters & Ducts

QUESTION NO. 1039: It has been some time now I've had to turn to you for help. Now I have another question and though it is on air conditioning I hope you can advise me or refer me to another source of information.

We have 10,000 air filters to clean and oil here, and wonder if you know of a better way than cleaning them with a steam hose and then oiling them. We seem to waste a lot of time and manpower. Do you know of any apparatus for cleaning more efficiently? The filters are mostly 20" × 20" × 2", industrial type.

Also you might know of a better way to clean ductwork than with just a vacuum cleaner. Thanking you again for the help in the past and for any help or reference you can give me now.—C.B., Spenard, Alaska.

ANSWER 1039: In an installation as large as yours, it is common practice to use automatic cleaning and servicing equipment. This is usually two fold in operation.

First, the filters are placed on a conveyor which goes into an enclosure similar to a traveling type oven. There they are subjected to high temperature and high pressure water sprays which contain an industrial detergent. Then they are allowed to drain free of water and are dipped into a filter oil. Next, they are placed on a centrifuge where the excess oil is spun free at approximately 200 rpm. The centrifuge is used where a large number of filters are to be cleaned, because by hand the time necessary to properly drain the filter is approximately 24 hours.

Select Proper Detergent

It has been the practice of many cleaning services and filter companies to use different types of detergents, and there are all kinds of claims as to which is best. However, it would be my recommendation that you consult with one of your local chemical or maintenance supply organizations to obtain a detergent which will work at the right pressure and temperature of an automatic machine.

A great many of the viscous impingement filters have been sold to the Government for installation in Alaska, and I assume that at least part of what you have are such units. As a general policy, better filter firms do not recommend the installation of a large number of high velocity, or viscous impingement, filters because of the very problem that you have brought up. The maintenance time and costs are far in excess of what they actually should be. Unfortunately the closest you can come to simplifying your problem would be the installation of automatic filter cleaning equipment, available at a cost of approximately $5,000.

New Auto-Cleaning Filter

For some time now, one filter firm has been trying to discourage architects and engineers from using a cell type filter which requires cleaning and oiling. In an installation with exceedingly large quantities of air they recommend automatic type filters. A new unit is now available which makes service of filters easier and more practicable. It is the "Roll-o-matic" filter which uses a continuous roll of glass fiber media.

In other cases, where there are a number of small installations rendering use of automatic filters not feasible, the use of "RENUglas", or equal, filter which is a permanent frame with a pad of glass wool media, is suggested. There just isn't any easy way of servicing a unit type filter which requires cleaning and oiling. Even in the automatic type cleaning operation, the cost for cleaning a viscous impingement type filter is approximately 75 cents per cell, in large quantities. In either of the new type filters mentioned, the replacement media can be had for approximately the labor cost of cleaning. In both cases it is much easier to handle the replacement filter and service it according to factory recommendations, than with viscous impingement filter. — C. B., Los Angeles.

Seeks Experiences With Monochlorodifluoromethane

QUESTION NO. 1040: In our experiments with "Freon-22" we have been trying to find under what conditions lubricating oil separates out in either the suction or discharge line. While our investigation is far from complete, we have found little difficulty of this type. Could you give us field experience where difficulties of this type have been encountered and under what conditions?—N.S., San Luis Obispo, Calif.

ANSWER NO. 1: You ask for field experiences, one of which I shall be happy to relate, although I don't know the "why" for the separation of the oil from the monochlorodifluoromethane. Picture some low temperature test facilities for industrial manufacturing concerns where a temperature of minus 80 F is required. The refrigerating plant installed under my direction is a two-stage monochlorodifluoromethane system.

Our problem was caused by the separation of the oil. Oil collected in the float switch body causing this control to become inoperative in several of the systems. (See fig. 1 and 2 for arrangement and detail of float). This control and the system of which it is a component was used for six different installations. Of those six, in two of them it was necessary to bleed off the float chamber, to drain the evaporators in another one at least every two months, while the other three performed satisfactorily without any apparent oil separation.

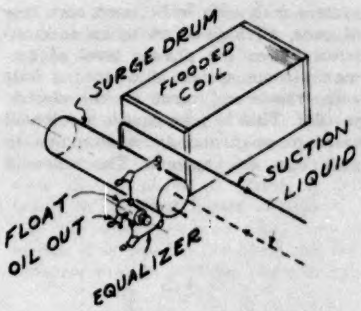


Fig. 1—Isometric of surge drum for minus 80 F laboratory system using monochlorodifluoromethane.

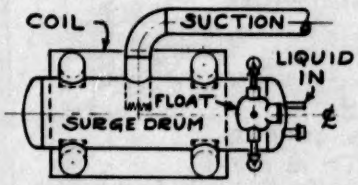


Fig. 2 — Piping arrangement of surge drum. Note float book-up and coil arrangement.

Our first thought was that the oil was of improper grade. We, therefore, selected three other makes of low temperature compressor oil and tested all three in the minus 80 F chamber. In an overnight test of placing a quantity of oil in cylindrical containers, all three froze up solid. However, that is getting away from our problem.

Observations

As this system was brought down in temperature, oil began to appear and to stratify at minus 40 F. It was first noticed through discoloration of the oil, then in thin layers stratified in the refrigerant, which layers gradually drew closer together until they had the appearance of a layer of linoleum on the top surface of the refrigerant in the float chamber. You could observe this through a sight glass in the float body. The glass could be taken out of the float, and the oil raked off the top of the liquid refrigerant had a consistency of molasses. Since this phenomena resulted in an inoperative float, a practical means of removing the oil became necessary. The oil skim arrangement pictured in Fig. 3 was devised.

Operating Instructions

In the process of pulling the evaporator temperature down the operator watches the liquid level in the float. If oil appears on the surface, isolate the float switch by closing the liquid and gas equalizing valves when the pressure gage

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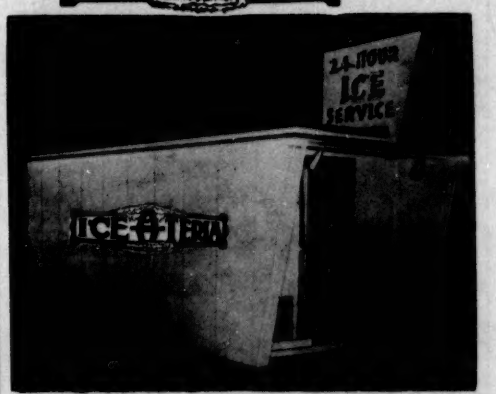

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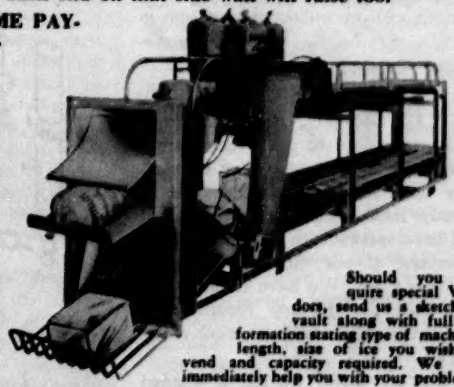


Should you require special Vendors, send us a sketch of vault along with full information stating type of machine, length, size of ice you wish to vend and capacity required. We will immediately help you with your problems.

reads approximately zero pounds. The liquid level is maintained such that the oil can be drawn off by skimmer tube. When the pressure rises above zero pounds in the float assembly, the ⅜ in. steel angle skimmer valve is opened to draw off all oil possible. During this operation it must be watched that the pressure never goes below zero pounds. To bring float switches back into normal operation, close first the ⅜ in. skimmer valve, and then open the float equalizing valves.

If oil appears after prolonged operation the same procedure may be followed as above, but more time is usually required to bring the pressure in float column above zero pounds.

ANSWER NO. 2: We have had no difficulty on the return of oil in a "Freon-22" system with an apparently oversized suction line. The system has a single stage of compression and when operating at minus 30 F suction temperature has a capacity of approximately 0.5 ton. It has a discharge line oil trap which can be by-passed if desired. The suction line size is 1.12 in. OD copper, most of which is horizontal but has a 2.5 ft. rise to the compressor. Ansul oil of 150 seconds Saybold viscosity is used. No trouble is experienced with or without the oil trap in operation. — E. P., Philadelphia, Pa.

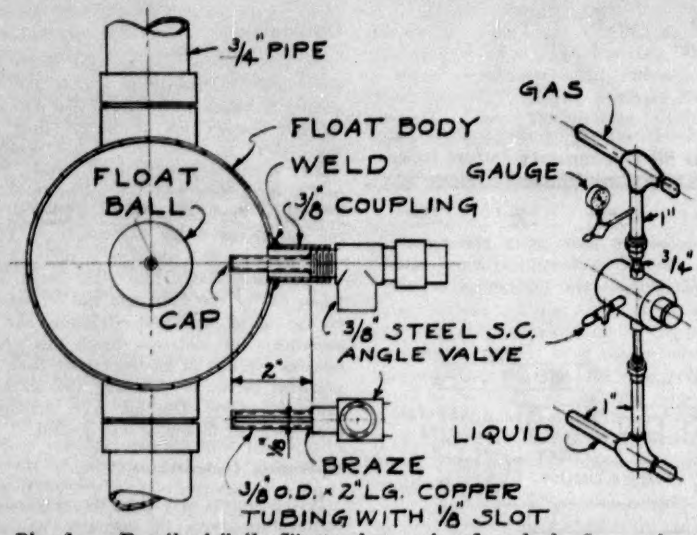


Fig. 3 — Detail of "oil-off" attachment for float body. Isometric at right details float fittings and gauge used for oil skimming operations.

Liquid Solenoid Headache Due to Valve or System?

QUESTION NO. 1041: We have liquid feed valves to our accumulators operated by floats which turn on electricity for operating solenoids. To be perfectly frank, these valves have not at all been satisfactory and cause about 90 percent of our difficulty in operating this plant. We have done everything that the factory recommends and still the valves will not work satisfactorily.

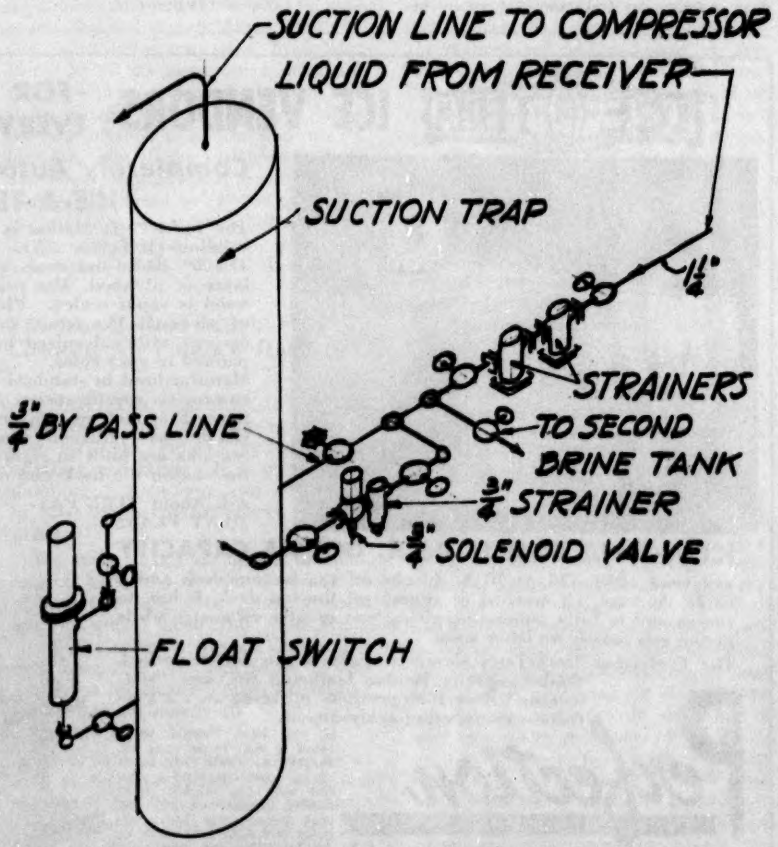
In our ice plant, we use a flooded system with coils in between each row of cans, all hooked on to an accumulator. When the pre-set level of ammonia in our system is lowered, a float valve raises and turns on the electric current. This in turn causes a solenoid valve to open and allow ammonia to pass into our system. The solenoid valve will either hang open or close, thus causing our brine system to be starved or flooded.

The main feeder line to the accumulator from the receiver is a 1-¼ inch. We have two strainers on this line, one a 2 inch and one 1-¼ inch. In addition we have a third strainer which is before the solenoid valve. The float valve never seems to give any trouble to speak of and almost always works perfectly.

I believe that the main thing causing the solenoid valve to hang open is foreign matter in the ammonia that passes through the strainer. Even though we have three strainers in our line, foreign matter simply gets into the system, and I do not know how to prevent it. We blow our coils and remove the oil from them as well as the accumulator. We do the same for the receiver and sometimes get long strings of waxy oil out of these.

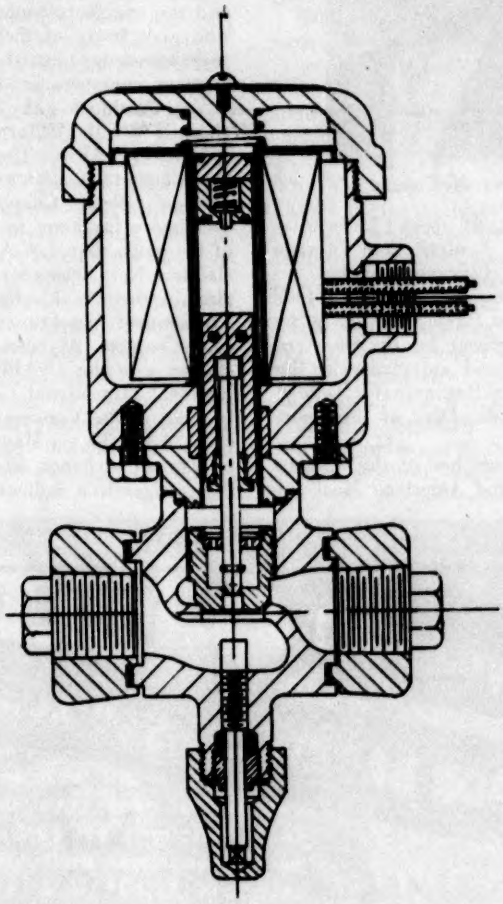
We have had them in operation for nine ice seasons and have found that they take a great deal of care and watching. The main things we have learned are as follows:

The valve has a gasket in it. If you are not careful, this gasket will protrude enough to make plunger inside the valve hang on part of gasket and thus fail to open or fail to close; mostly fail to close, thus flooding your system. The plunger has some corners on



Liquid Line Arrangement for Ice Making Tank Accumulator.

it and we have found that by taking a small file and rounding off edges somewhat, makes the valve work a lot better. Third, we have added a little lead weight to the plunger thus making it a few ounces heavier. This makes it fall better and keeps it from hanging open. We have also put a thin washer in the barrel in which the plunger works, thus not allowing the plunger to raise as high. This also keeps it from hanging open which is our worst trouble.



Section view of Series M-5 valve.—Courtesy Alco Valve Co.

When one does all this plus cleaning all strainers once a week, one can keep this valve working. My main objection is that is simply is too delicate to be practical and causes too much trouble and requires too much time with its continual requirement for a watchmaker's care and servicing. —C.A.M., New Mexico

ANSWER: With today's valve construction, I can't envisage difficulty with overhang of a gasket causing the valve plunger to hang up. The body-to-enclosing-tube assembly gasket of the current M-5 series valve is quite well contained. If the proper fibre asbestos gasket is being used, it is difficult to understand how the gasket could extend into the plunger chamber.

This series valve is a pilot piston type and, as you will see from the sectional drawing below, there appears to be little likelihood of any gasket "flow". The fact that a valve is of the pilot piston type may give a clew to the problem, particularly since the complaint is related to both failure to open and failure to close.

If the valve has seen nine years of service, it is possible that there has been sufficient wear on both the piston and the valve body to cause an increase in clearance area greater than the area of the pilot port. If the body-to-piston clearance is greater than the relieving area of the pilot port, when a high pressure difference exists across the valve (as might be the case at the end of a very long off cycle) the valve may fail to open simply due to the fact that the pilot port area is insufficient to create a pressure difference across the piston.

Regarding closing difficulties, there are several possibilities other than the obvious dirt difficulty mentioned. Wax, of course, can be an obvious source of difficulty and the questioner may be using a compressor oil with an excessively high pour point. Wax, plus one other factor, may easily cause closing difficulty on a pilot piston type valve. This series of valve is rated at 71.2 tons, at a 4-lb. pressure difference across the valve. Frequently liquid line valves are very materially oversized and with a hand expansion valve mounted down-stream (as it should be) pinched back severely to reduce the rate of flow into the accumulator, it is likely that only a very small pressure difference exists across the valve at the time of closure. With only a very small pressure difference across the valve, then wax or dirt can easily cause failure to shut off.

Another point is the possibility of a broken plunger kick-off spring, coupled with residual magnetism. Back in 1945 it was quite difficult for manufacturers to obtain the carefully controlled stainless steels necessary to avoid residual magnetism troubles. A given billet might show excellent non-magnetic characteristics at one end and totally unsatisfactory at the other end, and when it was drawn into tubing or rod there might be 500 ft. which showed good non-magnetic characteristics and 50 ft. which gave residual magnetism trouble. With the valve as old as the one described, it would be well to investigate this possible source of trouble.

It is hoped that these suggestions ultimately prove helpful. Actually, there is no pat answer to a problem of this kind. — T. D., San Francisco.

New Questions

Brine Inhibitor Test

QUESTION NO. 1042. How do you test for chromate concentration in brine?—C.B., Seattle.

System Description Asked On Hot Gas Defrosting.

QUESTION NO. 1043. A thermobank was briefly described in December Industrial Refrigeration article on Spreckles-Russell Dairy, Page 17, center column. Apparently this is a hot gas defrost system for blower type coils. How does it work? Are any simple diagrams available?—T.K., Edwardsville, Ill.

Electric Starter Selection

QUESTION NO. 1044. We would like to have an unbiased opinion of this problem. The question is on a 150 horsepower motor, 440 voltage, 60 cycles; which is the best type of starter for this motor—(1) across the line starter, or (2) manual immersed oil auto transformer type starter? What are the advantages of the specific one you would choose?—R.G., Kansas.

Seeks Information Source On Filter Efficiencies

QUESTION NO. 1045. What percent efficiency are metal filters compared to glass fiber filters for industrial air condition units. I understand that the metal filters are about 65% efficient, and that the dust will seep through and settle on the coils and into the duct work. M.C., Metairie, La.

Effect of CaCl + NH_3 On Stainless Steels

QUESTION NO. 1046. What effect does calcium brine with a small amount of ammonia in it have on stainless steel?—C.B., Seattle.

Anhydrous NH_3 Fertilizer

QUESTION NO. 1047. Is there any difference between ammonia which is used for refrigeration and that which is used for fertilizer?—J.N., Superior.

Change Frequency, Re-use of Electro-static Filter Oils

QUESTION NO. 1048. How often should electro-static (AAF) filter oil be changed? Can it be centrifuged and reused?—E. K., Chicago.

Personalities in "Brass"

NUMBER three in NAPRE'S top brass this year is another example of the self-made man, so typical of the association's membership. He is Bert C. McKenna, Vice-President.

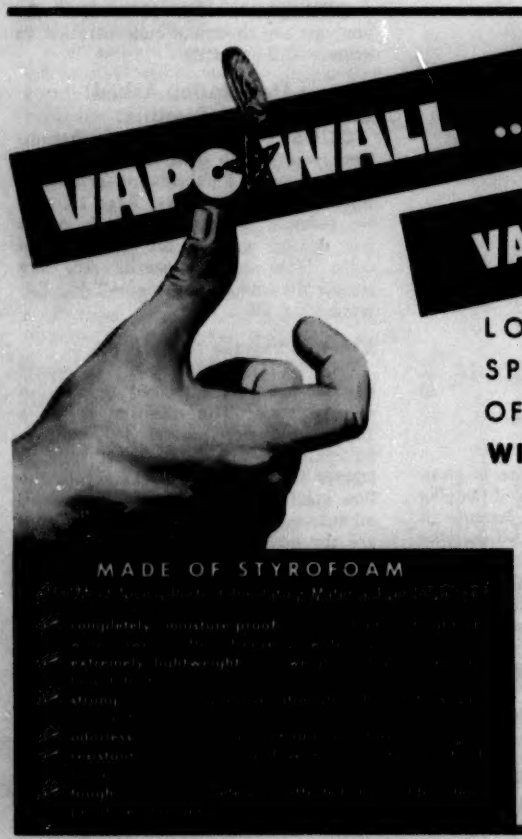
Bert served his apprenticeship under M. E. Bell, an NAPRE member who is now chief engineer and master mechanic for Sicks Breweries, Seattle. Bert has gained his refrigeration experience and knowledge in packing houses, breweries and creamery plants in Utah and California. He has been a chief engineer or a supervising engineer for the

Bert McKenna

past 16 years. At present he is chief engineer for Central Cold Storage Company in Chicago and has responsibility for the company's four plants in that area. Previously he was chief engineer for the Guerrero Street plant and sub-plants in the San Francisco Bay area for Golden State Co. Ltd., Div. of Foremost Dairies, Inc.

Bert is a member of the 12-man joint ASRE and American Meat Institute Refrigeration Committee. When asked how he started his climb in the refrigeration operating field, he told how member Bell encouraged him to take in meetings of NAPRE in San Francisco and attend a technical school. Under this guidance he completed a course of mechanical engineering subjects, including metallurgy and welding. Although this has helped him greatly, Bert is inclined to give most of the credit to NAPRE and the engineers connected with it, who give freely of their experience and knowledge for the benefit of younger engineers in the field.

Vice-President McKenna is charged with the welfare of members-at-large in NAPRE. They number as many active members as Los Angeles or New Orleans Chapters; but are even more far flung to distant parts of the globe than Los Angeles which claims a New Zealander and a Georgian in their ranks. Bert is a Past President of San Francisco and Chicago Chapters. At present he is also chairman of the (NAPRE) Midwest Regional Educational Conference, to be held at the Congress Hotel, Chicago, April 30 — May 1, where it is planned to honor 50-year men of the refrigerating industry.



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Midwest NAPRE Chapters To Hold Educational Meeting

TEN CHAPTERS of NAPRE, will be represented in the April 30 — May 1 Mid-West Regional Educational Conference to be held at the Congress Hotel, Chicago. Although Chicago Chapter is host for the social events, and carries the heaviest responsibility for planning and executing the meeting, the conference itself is a joint responsibility.

Bert C. McKenna, chief engineer, Central Cold Storage, Chicago, a National Vice-President of NAPRE, is Chairman of the affair, and Wm. L. Tiffin, Chicago Chapter's Secretary serves the conference in same secretarial capacity. Assistant Chairmen are Roy T. Burns, Refrigeration Inspector, City of Detroit, a National Director, NAPRE, and C. Ward Stoner, Vice-President, Ben-Hur Mfg. Co., Milwaukee.

Other conference committeemen are Louis P. Mantz, Pittsburgh; Chas. A. Conley and Alvis J. Clay, both of Memphis; and Ken N. Holaday, St. Louis; all national past presidents. Committee members from other chapters include Lester G. Winkler, Green Bay, Chester Belski, Twin Cities, Leland Kenagy, National Treasurer and John N. Muller, Kansas City, and Anthony Wochna, Indianapolis.

A feature of the Saturday dinner meeting is the intention of the gathering to honor engineers with 50 or more years experience in the industry. They will be cited for their contribution.

Short escorted field trips to downtown Chicago locations are planned in connection with the conference. Visits to cold storages, office air-conditioning plants, a heat pump installation, and other new installations are planned. Following a Sunday brunch, a chapter clinic will be conducted by the national officers. Out of town members are encouraged to bring their families, as a ladies' program has been prepared.

First Chapter to provide a speaker for the conference was Detroit. They are to be represented by J. C. Rehard, Thermalair Engineering Co., on the topic of "Water Conservation Practically Speaking". Rehard, an active member, was formerly Chief Safety Engineer, City of Detroit.

Los Angeles Chosen For Annual NAPRE Convention

CALIFORNIA Chapter No. 2 will be host to the 46th Annual Meeting, NAPRE, at the Ambassador Hotel in Los Angeles on November 8th through 10th, 1955. Motion picture and TV fans will recall that the Coconut Grove, one of the scenes of the recent Academy awards programs, is at the Ambassador Hotel.

Recently, Regis Gubser, our National President announced that William R. Burnett, a National Director, was to be the General Convention Chairman. He is to be assisted by Frank Eccleston, Edgar Marrs and Dale Rycraft as Assistant Chairmen. Convention Directors announced were Emmett T. Quinn, Elmer Johnson, Don Byl and the National President.

In February Gubser announced the appointment of the following local committee chairmen: George Paulick, Accommodations; E. L. Nelson, Entertainment; E. T. Quinn, Exhibits; Edgar Marrs, Arrangements; E. T. Quinn, Finance; Larry Benedict, Publicity; Frank Muzzy, Reception; Don Byl, Registration; and Michael Julius, Transportation.

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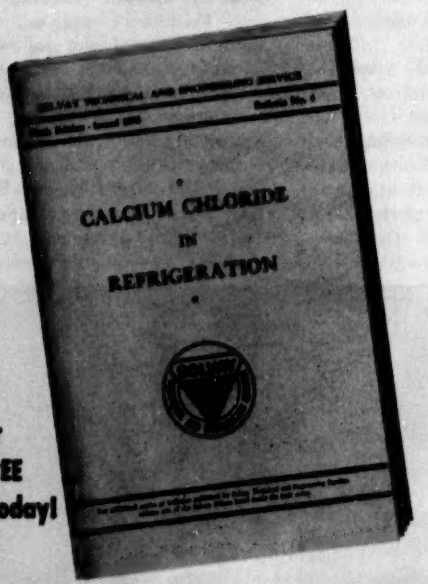

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Symposium on Low Temperature Standards For Containers

THE proceedings of a symposium on low temperature test methods and standards for containers, held in Chicago December 10, 1953 have been published by the National Academy of Sciences, National Research Council. Military planning for the United States must include preparation for action in the Arctic and knowing how to package items to meet this requirement is of great importance for success in providing supplies for troops and other military personnel in these areas. The symposium was arranged by the National Research Council Committee on packing, packaging and preservation, to bring together those who have had experience in this field of technology and to emphasize its military importance.

The papers and discussions summarize current knowledge on low-temperature test methods, appraise the facilities available for further experimental work, and indicate the technical problems which must be explored further. The program covered military implications, facilities for low-temperature research, effect of low temperatures on containers and container components. Copies of the report may be obtained from the publishers, Washington, D.C.

Temperature-Tolerance Studies on Frozen Foods

AT THE Western Utilization Research Branch of USDA in Albany, Calif., the large long-term project on temperature tolerance of commercial frozen foods under fluctuating and steady-state conditions has reached maximum level during the past year. The results on fruits are reaching the stage that will make publication possible. The reports will deal with tests for temperature history of frozen foods and with effects of temperature on quality of various kinds of packs. The work on frozen vegetables and poultry is now in its third year.

Effects of packages will be reflected in some of the data coming from these studies. It must be remembered, of course, that although these studies have reached maximal level, they are still considerable distance from completion. One matter that seems to be clearly demonstrated now is that time-temperature conditions can cause concealed damage that appears later, a sort of build-up of damage that becomes apparent subsequently. TRRF aids this work under its Project 32.—TRRF Information Bulletin.

ASHAC Members Honored

THREE members of the American Society of Heating and Air-Conditioning Engineers, who have attained the distinction of fifty years or more continuous membership in the oldest engineering society in its field, were appropriately honored during the 61st Annual Meeting of the Society held in Philadelphia January 24-27, 1955. The members cited are Samuel R. Lewis, Chicago; Henry C. Meyer, Jr., New York City; and William R. Stockwell, Michigan City, Ind.

Mr. Lewis, a member since 1905 and a founder of the Illinois Chapter, served as Society president in 1914 and was a member of Council 1914-1915. Mr. Meyer joined the Society in 1898 and served on the Council in 1915-1916. Retired in 1949 as the general manager of the manufacturing division of the Weil-McLain Co., Mr. Stockwell has been active in the profession and industry for many years and has been a member of the Society since 1901.

Impressions of an Australian Abroad

Engineer Comments on Industrial Refrigeration as he saw it in United States and Great Britain

J. J. BUDGE
James Budge Pty. Ltd.
Sydney, Australia

In the early fall of 1953, Jos. J. Budge, Mgr. James Budge Pty. Ltd., Sydney, Australia, toured the United States and England to learn of post war advances in industrial refrigeration. This article is a collection of excerpts from an address by Mr. Budge, a member of NAPRE and ASRE, to the Australian Institute of Refrigeration in which he related his experiences. Workman's wages, bulk milk handling, cold storage construction, pallet operations, and extruded ice cream were the features abroad which most attracted his attention.

WHEN an Australian is asked to pay the equivalent of 15 shillings for a haircut, he begins to realize that the cost of living in America, when paid in Australian money, is colossal. However, if you would journey comfortably in America, you must recognize the fact that it is necessary to pay American prices and to think in terms of dollars, not pounds, otherwise you become a very worried man in a very short time.

Costs of Living and Wages

However, the cost of living in America, as in all countries, must be referred back to rates of pay in that country. I thought it might be worth while to give a comparison between costs of living and wages in America and England and Australia —not because it is of very much technical interest, but because it may be of general interest and perhaps surprise you. The government statisticians might, perhaps, question the figures, but they are based on observations at the various places visited in 1953. On the whole, the working man in America appears to have the advantage over his fellows in the other two countries.

Address delivered to N.S.W. Division, Australian Institute of Refrigeration, October 12, 1953.

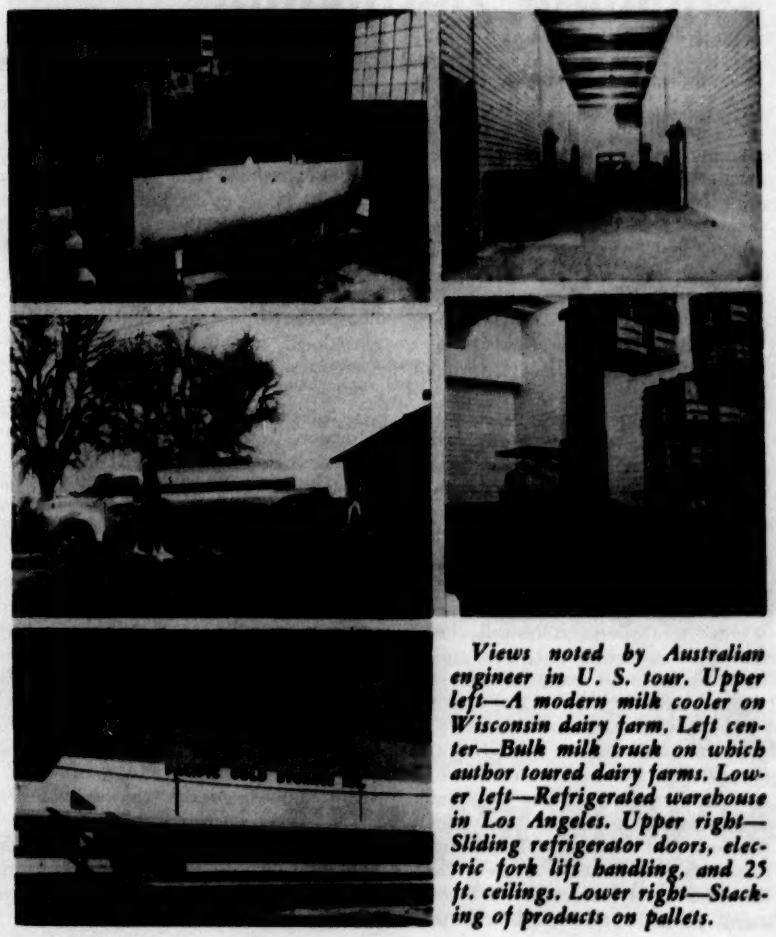
Dairying Observations

The American dairyman is becoming very interested in bulk milk collection. I was enthusiastic about the idea so I spent a little time in Wisconsin, a dairying state, seeing how they operate a bulk milk collection system. In parts of America the dairyman no longer runs the milk over a common cooler and then into cans, but he pours it straight into a stainless steel tank. (See illustration) It is then quickly cooled to a safe holding temperature, and stored for a day—even two days. It is then picked up in a tanker and taken to the depot where it is treated.

The second picture shows the tanker in which I spent the best part of a day visiting the farms of Wisconsin. You will see an insulated, stainless steel tank of 1000 gallons capacity mounted on a truck. There are two connections between it and the dairy; the larger one is a plastic milk hose and the smaller one is an electric cable which is connected to a power outlet in the dairy. The electricity is used to operate a milk pump mounted in the rear of the truck, while through the plastic hose the milk is drawn into the tanker.

The tanker operator is usually an independent carter who buys the milk from the dairy farmers and re-sells it to the milk depot; that is the basic principle at least, but he serves as a very good liaison man between the depot and the farmers. The farms to which I went had daily capacities ranging from about 80 to 160 gallons although some much larger are found in other places.

There has been some speculation in Australia about whether you can



Views noted by Australian engineer in U. S. tour. Upper left—A modern milk cooler on Wisconsin dairy farm. Left center—Bulk milk truck on which author toured dairy farms. Lower left—Refrigerated warehouse in Los Angeles. Upper right—Sliding refrigerator doors, electric fork lift handling, and 25 ft. ceilings. Lower right—Stacking of products on pallets.

TABLE 1 — COMPARISON OF REFRIGERATION MECHANICS UNIT EARNINGS IN AUSTRALIA, UNITED STATES AND ENGLAND WITH FOOD AND PERSONAL EXPENSES

		Sydney Week 40 hrs. Rate 90¢ hr.		Chicago Week 40 hrs. Rate $2.00 hr.		London Week 44 hrs. Rate 45¢ hr.	
	Unit	Cost	Hour's Work	Cost	Hour's Work	Cost	Hour's Work
Butter	lb.	47¢	0.52	75¢	.37	50¢	1.1
Eggs	Doz.	67¢	0.75	$1.00	0.50	85¢	1.9
Bread	1 lb.	5¢	0.06	16¢	0.08	9¢	0.21
Sugar	Lb.	8¢	0.09	09¢	0.04	8¢	0.18
Lamb chops	Lb	50¢	0.56	56¢	0.28	47¢	1.04
Grilling steak	Lb.	50¢	0.56	70¢	0.35	50¢	1.12
Bacon	Lb.	60¢	0.67	1.40	0.67	49¢	1.10
Bananas	Doz.	56¢	0.62	48¢	0.24	90¢	2.0
Oranges	Doz.	50¢	0.56	48¢	0.24	72¢	1.6
Tomatoes	Lb.	23¢	0.25	35¢	0.17	21¢	0.47
Haircut (men)		37¢	0.41	1.50	0.72	28¢	0.63
Phone calls (public)		2¢	0.02	15¢	0.07	3¢	0.07
Picture show		45¢	0.50	1.00	0.5	56¢	1.25
Gasoline	Imp. gal.	40¢	0.44	27¢	0.13	63¢	1.4

Figures for Sydney and London were given in pounds. Conversion by Industrial Refrigeration staff and First National Bank, Chicago.

put today's milk into the vat with yesterday's. There is no hesitation about doing so in America.

Cold Storage Comments

Another subject which may interest you is general cold storage. The high costs of insulated construction creates a problem in America which is no less acute than it is in Australia, and not all the newer cold stores are immediately successful financially. Another picture shows the newest of the stores in Los Angeles and I thought you might be interested in knowing something of it as one of the newest type in America. The general practice I found, is now to build in one story rather than in several stories.

The floor throughout the store is at platform height above the ground, both for convenience in handling and also to eliminate the risk of frost heave. An interesting point is that the height of the platform above the ground has been conveniently arranged by grading the ground outside it. Because of its varying heights, it can serve the wide variety of vehicles which come to the storage. From the small utility truck to the extra large semi-trailers, there is quite a variation in the height, and an allowance has been made for all to be well served.

This cold storage has a capacity of about one-half million cubic feet and is operated by one engineer, three cold storage men and one watchman. Their maximum daily through-put has been 200 tons a day. The increasing use which is being made of fork lift trucks is a feature of loading in many places of the world. Manual handling is costly, so refrigerated stores in many parts of the U.S.A. are using fork lift trucks or something similar to move goods around. This particular store is served by electrically operated fork lifts.

Sliding Reefer Doors

Entry to the store is through a sliding door opening from the platform into a corridor which is about 20 ft. wide and the corridor gives access on each side to the cold rooms (See picture). The floor to ceiling height is about 25 feet.

In America there are available many varieties of insulating material and in quite a number of storages several types of insulation are installed. Pacific had Redwood bark made up into batts about 3 ft x 12 inches in the walls and pumice in the floor. On the subject of insulation, I consider cork the most popular form of insulation which I encountered. It is costly, everyone complains of that, but it is still highly regarded.

In most cases, the procedure abroad in insulated construction resembles our own. However, one rather novel idea to save cost was to substitute other construction for the common internal cement plaster. The lower section of the walls, say to seven ft. height, was protected by asphalt boards set in bitumen. The upper section was sprayed with aluminum paint (which my friends in U.S.A. pronounce "Alloominum", with emphasis on the "loo" syllable.)

You may be interested in the arrangements for stacking goods at Pacific Cold Storage. A good deal of thought had been given to the frames (pallets) in which the cases of goods were stacked. These were designed to be stacked four high and the construction was such that the goods were adequately protected and there was sufficient air space between the rows. Picture shows general procedure for stacking pallets. In this case the room was built with a partition at the end of the room to house the coils over which air was circulated. Flooded prime surface coils of 1¼ inch pipe were installed at the end of the room with a vertical surge drum in the centre. Sporlan "Levelmaster" controls were used to regulate the flow of refrigerant.

Ice Cream Industry

One of the things which interested me, and others who have gone to England and America both, is that in the ice cream industry England seems to be ahead of America in some respects. In America, as in Australia, ice cream can be made from dairy products, whereas the English manufacturer has to use vegetable fats. However, the Englishman produces a very good article and one of the factors which should not be overlooked in regard to quality, is that he freezes the product quickly.

Generally, in Australia and America, ice cream which is to be cut into slices, is frozen by placing the product in a tray as it leaves the ice cream freezer, and then placing the tray in a cold storage room where it is held for eight hours or so until it is hardened. Before it can be cut into slices, it must be thawed out of the trays and sometimes replaced in the hardening room to produce a firm condition before it can be put into a slicing machine. However, the English ice cream manufacturer favors rapid hardening of extruded bars of ice cream. He has dispensed with trays in favor of a plate covered with paper on which the bar is extruded.

Extruded Forms

One company in England has specialized in this form of production. The hardening tunnel comprises an insulated box, including a structural frame work which carries sprockets for an endless conveyor chain. In side elevation the chain appears to run up and down over the sprockets. The chain is provided with hinge points on which trays are suspended.

The product is reduced from 22 F, at which it leaves the freezer, to about minus 10 F in forty minutes. This is achieved by rapid circulation of air at minus 30 F.

(Continued on page 57)

Poultry Advisory Committee Emphasizes Utilization Research

THE Poultry Research and Marketing Advisory Committee has emphasized utilization research in the recommendations developed during its meeting at Washington January 10-12. Established under authority of the Research and Marketing Act of 1946, the committee meets annually.

In utilization research, committee members urged development of more economical, more convenient, and new poultry products, and investigation of the technology and bacteriology of preparing, freezing, and reheating precooked frozen poultry products. They recommended research on prevention of quality loss in poultry and eggs, and a flavor loss in poultry. They advocated expansion of present work, with initiation of new work where necessary, to increase the keeping qualities of poultry and egg products through ionizing radiation treatment. They also recommended flavor stability studies of sugared egg solids.

Other principal utilization research recommendations were to determine the content of important nutrients in foods as the foods are commonly processed and eaten, to establish fundamental environmental requirements for packaging poultry products, and to study chemical composition and nutrient preservation of forage crops.

The committee recommended that State departments of agriculture expand their programs to maintain the quality of poultry and eggs through development and adoption of better processing, grading, packing, storing and other methods.

Refrigerated Storage on Conifer Seedlings

IN the December, 1954, issue of Journal of Forestry, Forrest W. Deffenbacher and Ernest Wright, U. S. Forest Service, Portland, Ore., have published extensive studies on cold storage of conifer seedlings in the Pacific Northwest. Advantages include available trees when needed in planting projects, quantity production in lifting and packing, and elimination of heeling in and extra handling by planters who order small quantities. They conclude that:

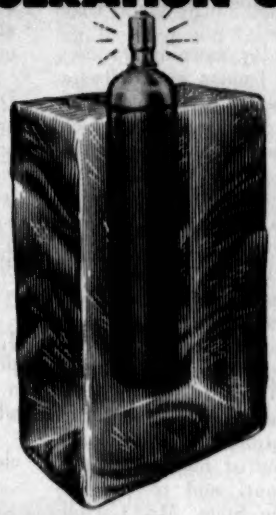
There is definite need for cold storage of conifer planting stock where nurseries serve areas at different elevations and climatic zones. Survival tests in nursery and field indicate conclusively that if proper storage conditions are maintained, survival is not impaired by cold storage up to six months. High moisture content was maintained in stock throughout this period; there was no apparent detrimental effect on mycorrhizal associations; survival was not significantly different from that of freshly dug trees.

Storage temperatures must be maintained at 33 to 35 F, and relative humidity between 90 and 95 percent. Circulation of air must be adequate. Trees should be packaged in waterproof bundles, their tops exposed, their roots packed in moist washed shingle tow or moss.—TRRF Information Bulletin.

Ice Properties Sold

PROPERTIES of The Arkansas Ice & Storage Company at Conway, Ark., including the Conway Ice Company, Economy Ice Company and Zero Lockers have been sold to The Standard Ice Company of Memphis. Paul E. Atkins will continue as manager, according to announcement by the new owners.

Freeze Out HIGH REFRIGERATION COSTS!



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4. **Extremely Low Moisture!**—doesn't freeze up expansion valves, corrode equipment or ice up in evaporators.

Operating costs are lower because you get more refrigeration per pound of Barrett Brand Anhydrous Ammonia than from a pound of any other type of refrigerant commonly used in food lockers, ice plants, cold storage and industrial cooling processes—all at a lower cost per pound for Ammonia. Order a trial shipment of 150, 100 or 50-lb. cylinders today!

GET THIS VALUABLE HELP!

☐ Please send your FREE Ammonia Leak Detector Kit. (Pocket size, this handy kit can be used over and over again.)

☐ Please have your specially trained Ammonia Technical Serviceman call, discuss the economical use, etc. of Anhydrous Ammonia. No obligation.

☐ Please send your valuable handbook, "Guide to use of Barrett Brand Cylinder Ammonia." (Shows most economical usage; contains chemical properties, handling, charts, etc.)

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Missouri Ice Convention

THE Missouri Valley Ice Manufacturers Association held its annual Convention January 9, 10 and 11 at the President Hotel, Kansas City, Mo.

At the Monday morning business session, genial Iceman and Collector of Jackson County, Alvin D. Hatten, welcomed the delegates. The meeting was addressed by C. P. Austin, NAII, Washington, D. C., and James V. Huffman, of Huffman Advertising Agency, St. Louis. Bob Ingham, sports commentator of KSD-TV, St. Louis, was the luncheon speaker.

The speakers at the Monday afternoon session included H. H. Mobley, Director, Missouri Division of Resources & Development, and Thomas G. Carroll of The City Ice Delivery Company, Wichita, Kansas. Mr. Mobley concentrated on the importance of the tourist business to the State of Missouri and to the ice industry of the State. Mr. Carroll showed photo-slides and discussed how he had greatly reduced his costs of processing ice.

Tuesday morning John R. Thompson, executive vice-president of the Missouri State Chamber of Commerce, discussed, the movement for a "Right to Work" law in Missouri. R. C. Trieman, manager of Sales Service, National Rejectors, Inc., analyzed and demonstrated coin handling of vending station coin boxes.

The Convention entertainment included a buffet dinner Sunday evening, a luncheon Monday, and a gay dinner-dance and an excellent floor show Monday night.

Officers were elected as follows:

President, R. C. Muckerman, St. Louis.

Vice President, Harold Margolin, Kansas City.

Secy.-Treas., V. A. Esphorst, St. Louis.

South Carolina Ice Annual Convention

THE ANNUAL convention of the South Carolina Ice Association, held at Charleston January 24-25 attracted a crowd of about 100 ice men and visitors.

William T. Jobe of Washington, D. C. general counsel of the national organization, reported to the group on federal legislation affecting the ice business. He also outlined subjects to be discussed at a regional conference in Durham, N. C., March 6. State legislative problems were discussed by John H. Lumpkin, counsel for the state group.

A sanitation committee, headed by J. B. Mahoney and the outgoing president, G. L. Rosebrock, presented a sanitation code for the industry which was adopted.

Officers for the coming year were elected as follows:

President, D. M. Moses, Sumter

Vice-president, L. D. Danforth, Columbia

Vice-president, George Martin, Newberry

Treasurer, E. T. Gladden, Columbia

Secretary, Miss Margaret I. Kinder, Kingstree.

Snow in Florida

A FAMILY in Tampa, Fla., spending its first Christmas away from its Gloucester, Mass. home had a lawn full of snow for Christmas. Actually it was about six tons of finely crushed ice, but it looked like snow to most Floridans and it was just about as satisfying to Mr. and Mrs. Jack Canis and their three daughters, Jackie, 12 years old, Yvonne, 9, and Shelly, 4. Canis, a shrimp-boat captain, made a deal with a Tampa ice company to cover his lawn with the stuff. Canis said it was the best $20 he ever spent.

Regional Ice Conferences

THE first two Regional Conferences of the National Association of Ice Industries have been scheduled. These meetings are being held as a part of two Unit Conventions. One day of the North Carolina Convention and one day of the joint Ohio-Indiana Convention will be devoted to NAII Conferences.

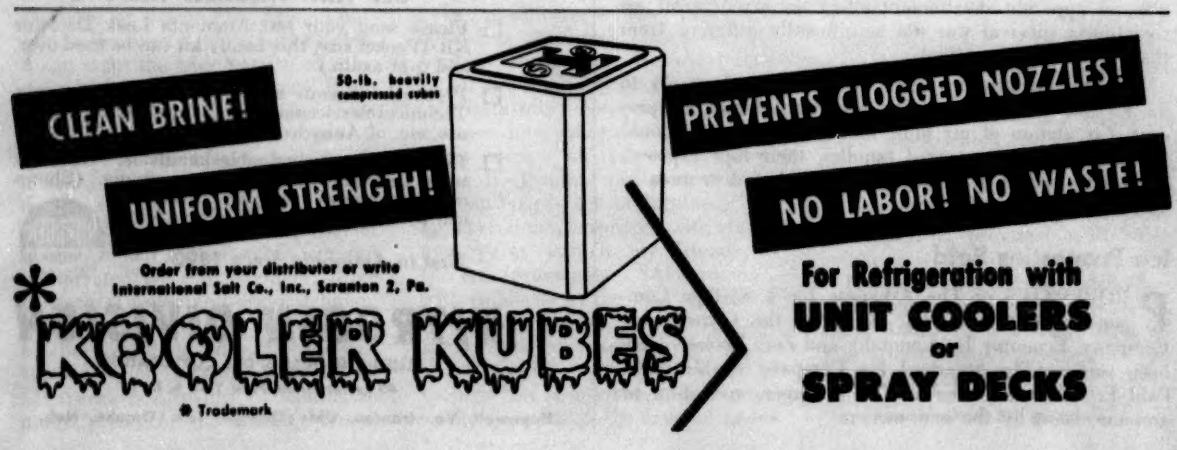
The North Carolina Convention will be held at the Washington Duke Hotel, Durham, N.C., March 7 and 8. The Ohio-Indiana Convention is scheduled for the Biltmore Hotel, Dayton, Ohio, March 28, 29 and 30.

As in last year's conferences, a full day will be devoted to a general round-table discussion. All discussion will deal with problems which are of local interest and local significance. This year the discussion will be augmented by photo slides made in ice plants. They show how Ice men are changing their processing operations, how they are saving money, how they are cutting costs, and how they are saving labor. Use of pallets, conveyors, and bag-closing machines will be illustrated.

Flaky Ice Cleans Autos

A NEW idea in cleaning automobiles has been devised by Emmet J. Courts of Hollywood, Calif. He cleans, washes and polishes them by bombarding them with flaky ice particles in a stream of compressed air. From time to time, he introduces into the air stream an emulsion of wax in water.

As Mr. Courts explained in Patent 2,699,403, the wax forms a protective coating, and the continued bombardment of the ice particles provides a smooth, highly polished surface. He keeps the ice flakes at a temperature at which they are somewhat slushy.



Alabama Ice Company Sells Beverages in Cans

AFTER many years of distributing bottled carbonated beverages as products of nine local bottlers, Oakdale Ice & Fuel Company, of Mobile, Alabama, has converted over entirely to canned beverages.

Oakdale Ice, which distributes from its 24-hour, 7-days-per-week ice plant, has long been dissatisfied with the large amount of work necessary to handle and sort empties, checking bottle identification, paying out refunds, etc. As a temporary measure to cut down on the cost of empty bottling handling, the firm had adopted a practice of issuing an identification card with every sale, so that refunds would be made only on bottles which were purchased through the Oakdale Ice Company plant.

Even this was not satisfactory, however, with the result at the beginning of the 1954 summer, when soft drinks began appearing in one-way cans, instead of bottles, Oakdale Ice Company immediately discontinued all bottle stocks. A spokesman for the company reports that about 150 cases of canned beverages are sold each week, which is only slightly below the volume which had been accomplished with glass bottles. While there is admittedly a small differential in overall sales, primarily due to the fact that Coca Cola is not available in cans, the savings in bottle handling at a labor cost of $1.12-per-hour-per-person, more than makes up the difference, according to the management.

The average customer has no complaint over accepting popular soft drinks in cans instead of bottles, it was likewise pointed out. The Oakdale plant pays $1.96 per case of 24 cans, and receives a 5 cent per case "display allowance" which is compensation for the well-established position of the Mobile plant. The cans are sold at 10 cents straight cold, or at $2.30 per case, non-refrigerated.

Ice Crusher and Cuber Makers Meet with Ice Men

MEMBERS of the National Association of Ice Industry's Research and Marketing Committee and engineers of some of the country's leading Ice crusher and cuber manufacturers met for a talk about their mutual interests and problems. The meeting was held January 19 at the Sheraton Hotel, St. Louis, Mo.

This conference was the first of a series of meetings with manufacturers of equipment sponsored by and participated in by the Association. The purpose of the session was to discuss the changes which have taken place in the manufacturing, processing, handling and selling of prepared ice with a view to bringing about changes in equipment which will be of benefit to all concerned.

The main topics considered were crushers which would break ice with little snow, crushers made of metal which would not rust; conveyors which were rust and abrasion proof; processing rooms, properly engineered with streamlined, automatic equipment; better and faster ice cubing machines.

Safety Awards to Drivers

AWARDS were presented to three employees of Wisconsin Ice & Coal Co. Milwaukee, with exceptional safe driving records at a dinner at the Stockyards cafeteria recently. John Kopmeier, vice-president, presented checks to Edward J. Hickey, 18 years without an accident; Alvin Talkowski, 15 years, and Fred Knuth, 13 years. Thirty-seven drivers in all received awards.

Regal Model 25

ICE CRUSHER

FOR PLATFORM SACKING OR PAPER BAGS OR GENERAL USE

Now all steel frame, legs, gate handle and grate. Self aligning ball bearings. Legs high enough for 25-lb. paper bag to be filled. Galvanized for the prevention of rust. ¾ HP. motor. Direct drive, no gears. Shelf for placing ice on before entering hopper. Slant hopper for easy loading. Hopper opening 12" x 10½". Speed of grinding is determined by grate setting. Four grate adjustments by turning the handle on side of crusher. Makes a very good fine ice on grate closed. Will take long 50-lb. blocks in hopper. Two belts for sure pulling power. Belts and motor pulley furnished when crusher is ordered without motor. Guard covers the flywheel and motor pulley.

Price .. $149.00, less motor. (Motor at prevailing price.) Shipping Weight 190 lbs.

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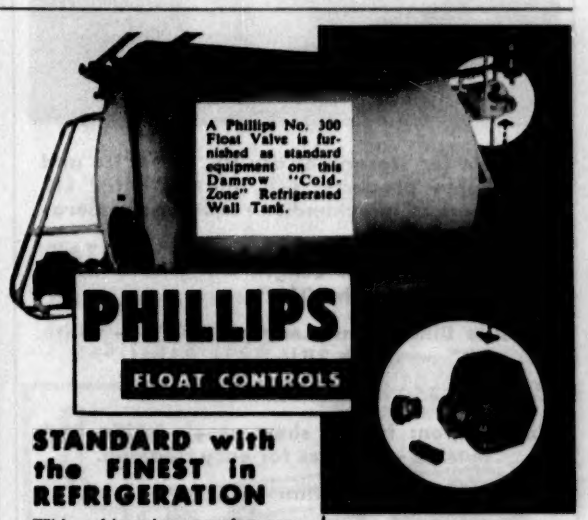
Ice Processing Equipment

MINERAL WELLS, TEXAS


A Phillips No. 300 Float Valve is furnished as standard equipment on this Damrow "Cold-Zone" Refrigerated Wall Tank.
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SERIES 300 PHILLIPS FLOAT CONTROLS

- SERVICEABLE — No "pump-down" needed to inspect or renew cartridge.
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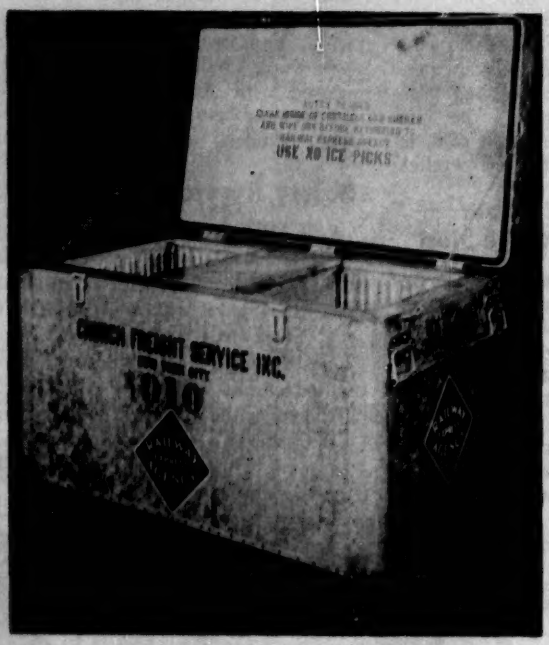

Suitable for storage of dry ice, water ice and perishable products; use on trucks for LTL shipments of merchandise requiring temperature protection.

Inside Dimensions: Length 44¼" — width 22" — depth 20½"

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Capacity: 350 to 400 lbs.

Construction: Heavy sheet steel, inside and outside — makes for easy cleaning.

Excellent insulation — 3"

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Packaging Developments

THE Quartermaster Food & Container Institute (1819 West Pershing Rd., Chicago) has published a symposium, conducted about a year ago, on "Low Temperature Test Methods and Standards for Containers". Data are reported on strength of woods, water vapor permeability of sheet materials, multiwall bags for cement, gas transfer of plastic films and low temperature degradation of containers. Interest here centers, of course, on very low temperatures, as encountered in regions of severe climate.

The new Polyester film developed by DuPont and called Mylar is coming into production in a 10-million dollar plant near Circleville, Ohio. It remains flexible from minus 76 to plus 300 F, has a tensile strength of over 23,000 pounds per square inch, is unaffected by many acids and alkalis, resists moisture and gas penetration, etc.

A most interesting new development for powdery materials is a large flexible drum, made of neoprene and fabric, up to 25,000 gallons in size, which can be collapsed and returned after it has been emptied. Neoprene is the synthetic rubber that is used in petroleum hoses.—TRRF Information Bulletin.

ASHAC Elects Officers

THE American Society of Heating and Air-Conditioning Engineers elected John E. Haines president at the 61st Annual Meeting held in Philadelphia, January 24-27. Vice president of Minneapolis-Honeywell Regulator Company, Minneapolis, Minn., Mr. Haines has served the Society as first vice-president during the past year, and held the office of second vice-president in 1953.

Other officers elected were: first vice-president, John W. James; McDonnell & Miller, Chicago, Ill.; second vice-president, Peter B. Gordon, Wolff & Munier, Inc., New York, N. Y.; and treasurer, Elmer R. Queer, Pennsylvania State University, State College, Pa.

Elected to serve on the Society's Council for a three-year term are: Bert W. Farnes, Bert Farnes Company, Portland, Ore.; Cary B. Gamble, Cary B. Gamble & Associates, New Orleans, La.; Walter A. Grant, Carrier Corporation, Syracuse, N. Y.; D. M. Mills, F. J. Evans Engineering Company, Houston, Texas; and serving for a one-year term on Council, Raymond T. Kern, Jennison Company, Fitchburg, Mass.

Job Directory For Graduate Engineers

ENGINEERS' Job Directory, has been published by Decision Inc. of Cincinnati, designed to help many of the nation's outstanding companies put their "story" before graduating engineers.

This guide is the first directory of its type directed specifically for young engineers. It is distributed to over 140 accredited engineering colleges and universities. The 129 participating companies include Alcoa, American Steel & Wire Div., Babcock & Wilcox Co., Continental Can, Goodyear Tire & Rubber Co., IBM, Minneapolis-Honeywell Regulator Co., National Cash Register Co., Pittsburgh Plate Glass Co. RCA, cooperated in presenting key facts in capsule form, giving precise information about the company, industry, year founded, products, number of employees and whom to contact. This enables the engineer to coordinate and match his interests and capabilities with the company in getting the right job with the right firm.

Rotary Boosters Discussed at Chicago ASRE Meeting

ROTARY Boosters was the topic of Don A. Parkhurst, Burge Ice Machine Co., Chicago, at the January 13 meeting of Chicago Section, ASRE. The speaker went into detail of engineering and design features, specifically treating the subject of multi-staging with this type of equipment. Mr. Parkhurst pointed out the economic and mechanical advantages of this equipment in low temperature operation, covering savings in maintenance cost and improvement of temperature control. He was preceded in the Engineering Service Committee by Fred L. Tarleton, manager, Refrigerating Engineering, Hot Point Company, who discussed the development of household refrigerators for the younger engineers.

Logan Lewis, vice-president, Carrier Corp., Syracuse, addressed the February 10 meeting of the Chicago Section. His topic was the Economic Background of Air-conditioning, in which he successfully convinced the members present that air-conditioning is no longer considered a luxury, and is economically justified, whether for domestic or institutional use.

Ice Delivered From Air

A LOS ANGELES man got aerial free delivery of ice recently. Alton M. Ludvickson said he heard an early morning "whoosch" and went outside to find a chunk of ice in his yard. He said his home is on the path of planes using the Los Angeles International airport and supposed that the ice was dropped from a plane.

COMING CONVENTIONS

NORTH CAROLINA ICE ASSOCIATION
March 7-8, 1955
Washington Duke Hotel, Durham, N.C.
LEWIS H. POWELL, Secretary

OHIO ASSOCIATIONS OF ICE INDUSTRIES
March 28-30, 1955
Biltmore Hotel, Dayton, Ohio
ELIZABETH SHANNON, Secretary

INDIANA ASSOCIATION OF ICE INDUSTRIES
March 28-30, 1955
Biltmore Hotel, Dayton, Ohio
ROBT. WALTON, Secretary

AMERICAN WAREHOUSEMEN'S ASSOCIATION
April 12-16, 1955
Edgewater Beach Hotel, Chicago, Ill.
WM. K. DALTON, General Secretary

NATIONAL ASSOCIATION REFRIGERATED WAREHOUSES
April 12-16, 1955
Edgewater Beach Hotel, Chicago, Ill.
WM. K. DALTON, Exec. Vice-Pres.

REFRIGERATION RESEARCH FOUNDATION
April 12, 1955
Edgewater Beach Hotel, Chicago, Ill.
H. C. DIEHL, Director

NAPRE MIDWEST REGION ENGINEERS CONFERENCE
April 30 — May 1, 1955
Congress Hotel, Chicago, Ill.
BERT C. MCKENNA, Chairman
WM. L. TIFFIN, Sec., 37 W. Van Buren St., Chicago

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offer you the benefits of over 70 years' specialization in the pipe-bending field: experienced engineering and exact production, with smooth bends, perfect welds, and accurate measurements.

Whenever you need coils, write for our free tracing-chart which shows standard dimensions ready to fill in. It will simplify your specifications—whether for zig-zag or nested box or conical or round-flat or reducing coils.

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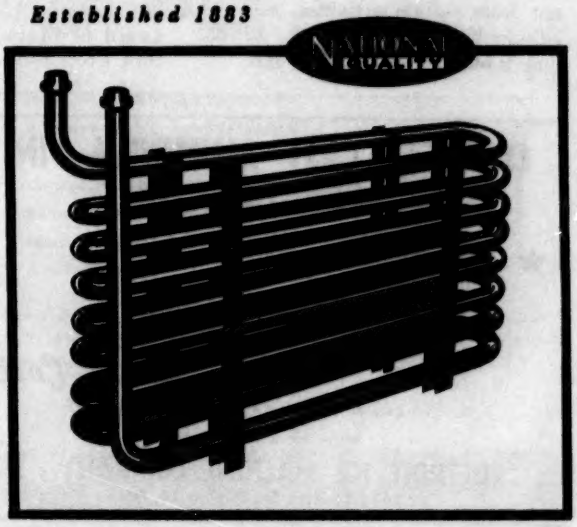

News of People

Milling Joins Vivian

AS OF January 1, R. N. (Bob) Milling, Secretary for many years of the Delta States Ice Association, became associated with the Vivian Manufacturing Company, with headquarters at St. Louis, as a traveling representative. His territory for the present will center in the Delta States area, although he will travel portions of several other states. Vivian Manufacturing Company is also handling on a national basis the sales of Taylor-Made Ice Vending Stations, manufactured by the Taylor-Made Ice Vending Manufacturing Company at Eupora, Miss. Mr. Milling will still maintain his home in Monroe, La. Through Vivian Manufacturing Company, he is also handling the accounts of Chemical Solvent Company. Mr. Milling's former connection with Delta States has been filled by the election of Mrs. Edna Vaughan, formerly assistant secretary.

F. W. ALLEN, Professor Emeritus of Pomology in University of California, and member of the TRRF Scientific Advisory Council, has received a distinguished award for work on growth-promoting sprays, presented by American Society For Horticultural Science.

DR. RUDOLF PLANT, distinguished and universally beloved Director of the Kal-Tetechnisches Institut in Karlsruhe, Germany, has retired from his administrative position, though not from certain activities, such as editing Kaltetechnik and the 12-volume Handbuch Der Kaltetechnik.

Edna Vaughan New Secretary Delta States

AT A meeting of the Board of Directors on January 20, Mrs. Edna Vaughan was appointed to serve as secretary to carry on for Delta States Ice Association in Bob Milling's stead. Mr. Milling resigned to accept a position with Vivian Manufacturing Company. As office secretary Mrs. Vaughan served the association for 15 years, and will begin her 16th year in February under her new status. Her years of experience as office secretary will serve her well and with that experience and her contacts with Delta States ice men, she will be able to serve the Association with complete satisfaction.

QUAID MINICH, who has held top engineering and managerial posts in several West Coast cold storage firms since 1945, has been appointed warehouse superintendent and chief engineer of the Inland Cold Storage plant, near Kansas City, Mo., Leonard H. Strauss, president, announced. Mr. Minich will play a key role in a pioneering effort in the storage field. Inland is an underground warehouse which specializes in the in-transit storage of frozen foods.

WM. D. WRIGHT, secretary of the Illinois Association of Ice Industries, writes from Gulfport, Miss. that he and Mrs. Wright have been there since December 15 and expect to stay until April 1. It has been a rather cold winter there, he reports, but much more pleasant than Illinois Weather.

J. C. ELDREDGE, Professor of Agronomy in Iowa State College, who conducted the TRRF-aided research on popcorn, recently received an award of distinction from the Popcorn Processors Assn.

GEORGE H. HAMMOND, founder of the dressed beef industry and refrigeration transportation, was honored posthumously January 26 when his portrait was hung in the gallery of the Saddle and Sirloin Club at the Union Stock Yards in Chicago. Mr. Hammond died in Detroit in 1886.

The unveiling took place at a luncheon attended by meat packing, railroad and stockyards executives in the Chicago area and members of the Hammond family.

FRANK C. FILIPPONE, formerly Director of Service Operations for Snow Crop, is now with The National Cold Storage Company, Brooklyn, N.Y.

DEATHS

Kline Harris

THE death of Kline E. Harris, manager of the Hygeia Ice & Fuel Company, Spartanburg, South Carolina, resulted from an automobile accident January 23, while enroute to the South Carolina Ice Association Convention at Charleston. Mr. Harris was a passenger in a car driven by Terrell E. Meek of Charlotte, who was injured. T.D. Broome, a Hygeia employee was also in the car but was not injured. A hit and run driver in another automobile was the cause of the accident.

Mr. Harris went to Spartanburg about 30 years ago from Greenville, where he had been with the Southern Ice Company. He had been identified with the business life of Spartanburg for many years, as general manager of the Hygeia Ice and Fuel Company. He was 57. He was an active member of the South Carolina Ice Association and was the first president of the Southeastern Retail Coal Association.

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★ Saves Space

★ Saves Weight

★ Saves Cost

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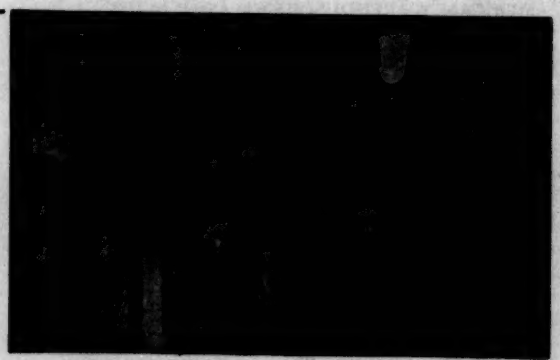
2615 Twelfth St., Detroit 16, Mich.



DIMCO Evaporators in a Frozen Food Storage Room at Great Lakes Terminal Warehouse, Toledo, Ohio. A typical installation facilitating palletizing.

Impressions of An Australian Abroad

(continued from page 50)

Popsicles

The ice cream manufacturer overseas today is very much interested in competition from the lower priced frozen sweets, or water ices. One plant in England produces four million of that type per week. This competition is also interesting ice cream manufacturers in Australia, where, as in overseas countries, the increasing cost of dairy products is making the cheaper line very attractive.

I appreciated the courtesies which were extended to me by overseas associations. The officers of NAPRE with headquarters in Chicago, ASRE in New York, and the British Institute of Refrigeration in London, were extremely helpful. I was given introductions and made good friends because of the helpful interest which the secretaries of those bodies displayed. I told them something about our own Institute and found that their problems are very similar. I am indebted to many other folk as well. Throughout the U.S. and England. I was given a warm welcome everywhere and it would be impossible to acknowledge even a fraction of it tonight. If some of my overseas friends happen to see the text of this speech in print, I hope they will accept this acknowledgment of my appreciation of friendship and practical help. In England and in the U.S.A. they were grand!

Surplus Butter Stocks Down

SPEAKING before the Winter Conference of the National Dairy Council in Chicago on January 26, Secretary of Agriculture Benson pointed out that not a single pound of butter was bought by the Government during the month of December, the first month of no purchases in two years. Furthermore, he said that last summer's stocks of government-owned butter of 466 million pounds dropped to 262 million pounds on January 12. In addition, stocks of cheese have recently been reduced by more than 100 million pounds. Increased promotion, donations, stepped up promotion and the fact that dairymen are bringing their production into line with market demand were the main reasons given for this reduction in surplus stocks.—NARW Cold Facts

North Atlantic Chapter

THE Spring Meeting of the North Atlantic Chapter, National Association Refrigerated Warehouses, is scheduled for May 18, 19 and 20 at Carvel Hall, Annapolis, Maryland. In charge of arrangements are Paul D. Burrill of Boston, and A. G. Janney. Baltimore. A big attendance is expected—NARW Cold Facts

Merchants Ends 65th Year

THE MERCHANTS Refrigerating Co., New York City, is rounding out its 65th year in business. In a booklet commemorating this record of progress, the company points out that since it was started in 1889 with its 300,000 cu. ft. capacity, it has grown to a capacity of 23,095,554 cu. ft.

Tennessee Warehouse Sold

THE Tennessee Cold Storage Company, Nashville, Tenn. has been sold to Seymour Levin and Gilbert Frank, Miami, Fla., and the company name changed to The Tennessee Warehouse & Cold Storage Corp. The new owners announce that more space will be added.

S&S ICE VENDING STATIONS
and Ice Vending Equipment

AUTOMATIC!
REFRIGERATED!
DEPENDABLE!

S&S Frozen Food & Ice Cream STORAGE DEPOTS

For Independent, Outside Refrigerated Storage! . . . Complete Ready to Plug In! Portable!

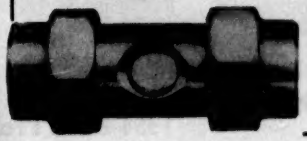
Slash distribution costs . . . add frozen food profits for chain stores and super-markets!

Sold by Leading Ice Equipment Distributors Throughout the Nation

S&S VENDING MACHINE COMPANY

SEE INSIDE YOUR REFRIGERATION LINES WITH THE NEW

LIQUID EYE®



INDICATOR
3000 SERIES

- High pressure Pyrex sight glass.
- Pressure-sealed Neoprene Sealing rings at both ends.
- Withstands operating pressures of 600 psi.
- Unrestricted full line flow.
- Ruggedly constructed of cadmium plated steel.
- Ideal for wide variety of applications.
- Available in ¾", 1" and 1-¼" I.p.s.

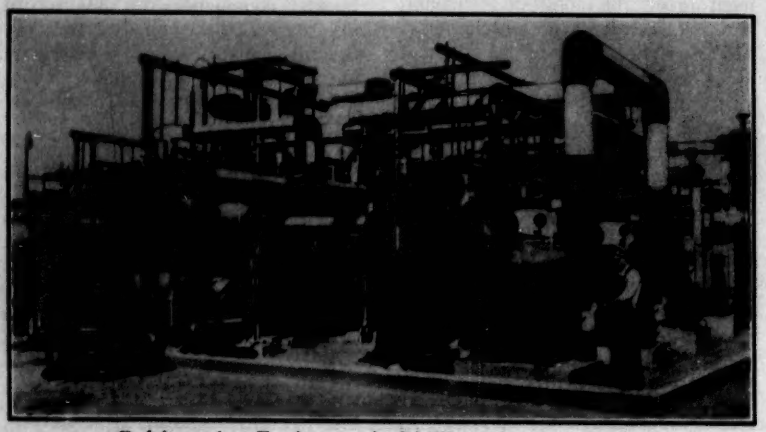
Same design in the 5000 Series with extended tube ends for ¾" thru 1-⅝" copper tube sizes. All liquid Eye Indicators carefully tested to insure trouble-free performance.

Send for Catalog D-55 covering the complete Allin line.

Allin MANUFACTURING COMPANY
1153 W. Grand Ave., Chicago 22, Ill.

Chemical Company Uses Refrigeration To Separate Gases

PARA-XYLENE (pronounced pair-ah-zi-lean) is the newest addition to petrochemicals being sold by Phillips Chemical Company. Production started late last year in the Company's new plant near Big Spring, Texas. Philips' plant is the first in the country to produce 98 per cent pure para-xylene in commercial quantities. The product is sold for use in the manufacture of synthetic fiber.



Refrigerating Equipment in Phillips Chemical Plant

The process used to produce high purity para-xylene is called continuous fractional crystalization. It is new and revolutionary, having been perfected after several years of research and pilot plant work. The company has a number of patents on the process and apparatus and other patents are pending in the U.S. Patent Office.

Their new plant is built adjacent to Cosden Petroleum Corporation's refinery, which is supplying feed stock. In Cosden's refinery there is a BTX (benzene, toluene, xylene) unit which makes a crude xylene stream. This is the feed stock for the Phillips plant.

Crude xylenes contain four compounds—para-xylene, meta-xylene, ortho-xylene and ethylbenzene. Para-xylene must be separated from the other three. The most common method of separating hydrocarbons is distillation, which works well when the various hydrocarbons boil at different temperatures. Unfortunately, para-xylene and meta-xylene boil at almost the same temperature, so that pure para-xylene cannot be separated by distillation. Luckily, para-xylene has a high freezing point, plus 56 F, whereas the other xylenes and ethylbenzine freeze well below zero. So it is possible to freeze out the para-xylene, using Phillips' new continuous fractional crystallization process. This process also promises to be of great value in other industries where separation of certain liquids has been an almost insurmountable problem.

At Big Spring, six Frick compressors supply temperatures down to minus 125 F. An 8-¾ by 6 machine handles ethylene at low temperature in a cascade system. This gas is condensed at about minus 65 F by ammonia boosters of size 13-¼ by 9 (two) and 11½ by 8: these discharge into a 9 by 9 and 5 by 5.

At the Cosden Refinery was installed a 15 by 10 booster and a 9 by 9 second-stage and highside for maintaining temperatures down to minus 50 F.

1954 Pack Frozen Cut Corn

THE 1954 pack of frozen cut corn declined to 77,922,473 pounds, according to a preliminary tabulation prepared by the National Association of Frozen Food Packers. This total represented a 26 percent reduction from the record pack of nearly 105 million pounds put up in 1953.

An analysis of container-size usage this year indicates a somewhat different pattern than in 1953. Retail sizes in 1954 accounted for about the same percentage of the total pack as they did in 1953 (42%), but small institutional sizes showed a sharp decline in importance, 22 percent of the total in 1953 vs 12 percent this year.

Meat Packers Promote Frozen Food Sales

PROMOTION of frozen meat sales by meat packers was the subject of a signed article in a recent issue of The Chicago Daily News. The example of Armour & Co. was cited, with the comment that the promotion is aimed at the institutional and the individual consumer markets. Although still an infant in size, compared to Armour's total sales, the article continues, fresh frosted meat tonnage jumped 42 percent in the fiscal year just ended.

Restaurants and hospitals are being told by way of specially prepared color film and in special literature how the frosted meat portions eliminate the guesswork on meat costs per customer. Being packer prepared, the portions are uniform as to size and weight and are ready for cooking with a minimum of handling.

This recalls the theme of an address before a restaurant group some years ago. The speaker warned that a restaurant's solvency could be decided by the amount of beef the cook put into the beef stew!

Obviously, situations like that can't happen when the restaurant owner buys a 10-pound box of veal cutlets in which the portions weigh exactly three ounces each. To the housewife, Armour is preaching convenience of handling, ease of storage in a home freezer and absence of bone, excessive fat and other waste materials.

Retail prices naturally are a bit higher than for cuts with bones included. But milling companies proved months ago that women are more than willing to purchase a more expensive cake or biscuit mix that saves both time and labor. The Armour fresh frosted meats now number 18 items.

ASHVE Approves Change of Name to ASH&ACE

BY A heavy total vote of 4081, a majority of 5919 eligible voting members of The American Society of Heating and Ventilating Engineers expressed their approval of changing the name of the sixty-year old engineering society to American Society of Heating and Air-Conditioning Engineers, Inc. The tellers report showed 3280 in favor, 654 opposed, and 147 invalid.

The new name, as decided at a special meeting Monday, November 22 in the Hotel Statler, New York, was filed with the Secretary of State of the State of New York to become effective November 23, 1954.

MANUFACTURERS' NEWS

Fiberglas Conducts Seminar For Meat Packer Engineers

MEMBERS of the American Meat Institute - ASRE joint engineering committee were guests of Owens Corning Fiberglas Corp., at a seminar on products, services offered, and solutions to packer engineering and insulation problems Friday, January 21, in the Havana Room, Sheraton-Blackstone Hotel, Chicago. This was one of a series of forums or clinics conducted currently by Fiberglas throughout the United States for industries utilizing industrial refrigeration, and for contractor-applicator representatives of Owens Corning Fiberglas Corp.

Fig. 1. Participants in the meat industry-insulation forum, Chicago, January 1955: Back row, l. to r., F. P. Neff, Tupman Thurlow Company; John S. Bartley, Rath Packing Company; Stachalek, Bertsch and Wimsatt, Fiberglas Corp.; Jensen, Fiberglas; L. J. Rudolph and Bert C. McKenna, Central Cold Storage Company; J. R. Kelahan, Nickerson & Collins Co.; D. S. MacKenzie, American Meat Institute; Second row: A. J. Egan, of Smith, Brubaker and Egan; W. C. Matthews, Armour & Co.; Henry D. Tefft, AMI; T. A. Brophy and Byron S. Elliott, Swift & Co.; Standing: Cox and Jones, Owens Corning; Front row: Higgins and Grindley, Fiberglas; E. N. Johnson, Swift; K. E. Wolcott, Wilson & Co.; and C. D. Macy, G. A. Hormel Co. R. Starr Parker, Valleydale Packers, at the meeting, departed early.

An eight-member staff of Owens Corning conducted the meat packer meeting in January. Headed by Allan W. Cox, low temperature insulation sales manager; members M. G. Jensen, manager, Technical Services, Chicago; J. E. Higgins, Chicago branch manager; J. T. Bertsch, technical asssitant industrial insulation products, Toledo; J. P. Wimsatt, low temperature specialist, Chicago; and S. J. Stachalek, technical product assistant, industrial construction materials division, Toledo, conducted the discussion before lunch. Mr. Jensen opened the meeting by outlining to the group the technical service divisions established by Owens-Corning in Chicago, New York, Washington and San Francisco, to assist them in analytical design and specification work.

Mr. Higgins discussed Chicago office facilities and personnel, by indicating to the group how the Chicago office could be of assistance to them. He was followed in discussions by Low Temperature Manager Cox, who outlined the recent trends in insulation applications and construction. He related the numerous large scale achievements of the firm, with particular emphasis on the dry wall type of construction.

His remarks were followed by a film showing tilt-up concrete panel and dry wall construction used in Pajaro Valley of California. The film was a presentation of American Bitumals and Asphalt Company. Construction techniques with various fiberglas products, as applied to meat industry requirements, were discussed by Bertsch and Wimsatt. Each utilized isometric sketches and mock-up displays to illustrate specific points (see Fig. 2).

Case problems submitted to the forum in advance by the meat packers group, were discussed by Technician Stachalek. Three particularly trying problems with sweating pipe lines and ducts, and wall and floor failures, led into a technical lecture on humidity and vapor barriers.

Following the noon-time break with its refreshments and luncheon, courtesy of Fiberglas, Mr. Cox continued as co-ordinator of the discussion with Messrs Bertsch and Stachalek returning to answer questions put by the engineers. They were assisted by Messrs Higgins and R. B. Grindley, industrial sales representative, Chicago.

Palmer Jones, with the Research and Product Development Laboratory of Owens-Corning at Newark, Ohio, wound up the session, telling the group of things to come of particular interest to them as engineers. He announced that his firm had developed an even finer fiber of much smaller diameter, which when processed results in greater thermal efficiency and better physical stamina. Some fiberglas insulation products are at present utilizing the new fiber, with all type products expected to be produced with the new fiber by the close of the calendar year.

Mr. Jones also elaborated on experiments being conducted by the firm with inert gases, glass fibers and vinyl vapor barriers for more efficient thermal insulation. The result of such experimentation are ex-

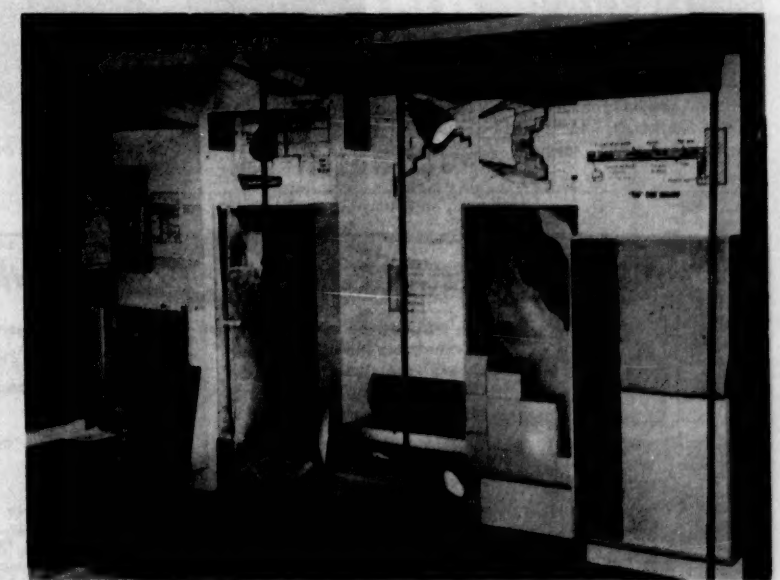


Fig. 2. Effective display used at meat industry clinic: actual materials in mock-ups; details in isometric; whole display is portable.

pected to lower insulation thickness of domestic refrigerators to half their present thickness, making possible 12 cubic foot of storage in the same size equipment which today holds only 9 cubic foot of merchandise.

Ed. N. Johnson, Swift & Co., Chairman of the meat industry committee, expressed the thanks of the entire group for the invitation to attend the forum. He was seconded in his remarks by Henry D. Tefft, Secretary, American Meat Institute. Others present are listed in the legend below fig. 1.

New Refrigeration Consultant Firm

S. W. BROWN, former chief engineer of the marine department of Carrier Corporation, has opened his own business as a consulting engineer with offices in the Chrysler Building, New York City. The firm will specialize in the design and application of air conditioning and refrigeration systems.

Mr. Brown resigned from Carrier January 1, 1955. He joined that organization's research and development department in 1937 and was named chief engineer in 1943. In the latter capacity he was associated with the engineering and design of refrigerating or air conditioning systems on more than 10,000 ships, including all but one of the passenger ships constructed in the United States following the termination of World War II.

A licensed professional engineer in New York State, Mr. Brown is first vice chairman of the New York Chapter of the A.S.R.E., and a member of the Society of Naval Architects and Marine Engineers, the American Society of Heating and Air Conditioning Engineers and of the Society of Naval Engineers.

Ansul Pays Safety Bonus to Workers

MANAGEMENT of the Ansul Chemical Company of Marinette, Wis., paid out an extra day's pay to its more than 600 employes in January, in recognition of the workers' achievement of going through the entire calendar year 1954 without a lost-time accident. The company computed the men worked a total of 1,043,199 hours without an accident, marking the first time they went over the million man hours worked mark.

The last lost time accident occurred on November 24, 1953. In the 39 years since the company was founded, there have been only 29 lost time accidents and no deaths. From 1933 to 1953, Ansul achieved a remarkable safety record, achieving either a perfect mark, as in 1954, or recording the lowest accident frequency rate in its industry, a figure based on the national average for all industries manufacturing similar products. Ansul produces dry chemical fire equipment and industrial and refrigerant chemicals.

National Rejectors Adds New Service Engineers

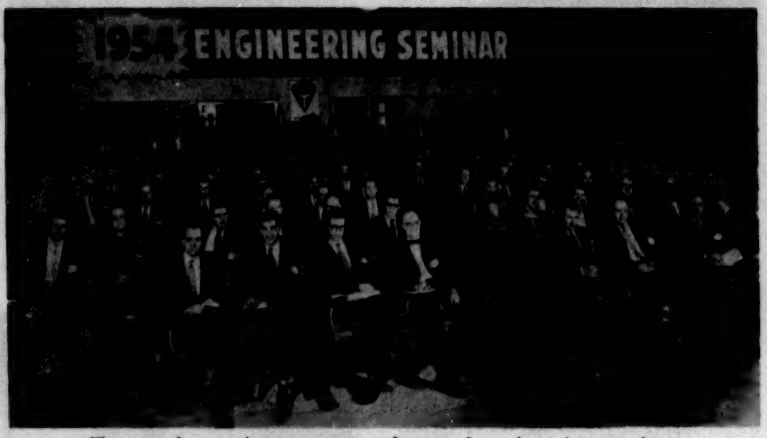
AN additional service engineer is being added by National Rejectors Inc., St. Louis, Mo. in each of their branch offices to provide instruction and equipment service for National customers. In an effort to help operators learn more about National coin handling equipment on vending machines, these new men will be in the field working closely with customers. They will be qualified to service and instruct on all

Trane Engineering Seminar Stresses Product Knowledge

EIGHTY-FIVE of The Trane Company's 260 field sales engineers recently increased their knowledge of the company's refrigeration and air conditioning products by attending the second annual engineering seminar at La Crosse, Wisconsin. During the three-day seminar, they heard nearly 30 technical and semi-technical illustrated talks.

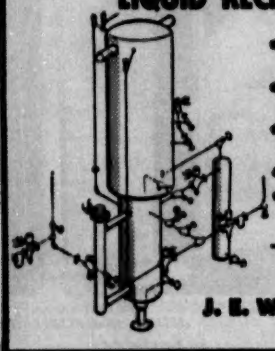
The seminar is part of a continuing educational program through which Trane's large sales organization is kept informed of new and improved company products, application of these products and industry trends. M. L. Hoglund, Manager of Refrigeration Sales and Seminar Director, told the visiting salesmen: "To sell successfully today, the major requirement is that we have a sound and thorough technical knowledge of our products and their most effective application."

The talks included such subject matter as refrigeration piping and controls, motors and starters, heat pumps, and big building air conditioning. Tours of the new Trane laboratory "The House of Weather Magic" and of enlarged plant areas were also in the seminar program.



Trane sales engineers at second annual engineering seminar.

LIQUID RECIRCULATORS **Watkins** EVAPORATIVE CONDENSERS



- Full-flooding of all evaporators guarantees high efficiency.
- Excess cold liquid is recirculated to evaporators.
- Protects compressor from slugs.
- Oil separator is built in.
- Permits complete hot-gas defrosting in a very few minutes.

- No fans. No blowers.
- Uses less than 5% of water used in shell-and-tube condensers.
- Will carry high overloads.
- Low first cost.
- Low maintenance cost.

"THEY FOLLOW THE WEATHER"

Write for bulletins and specific information for your individual refrigeration system.

J. E. WATKINS CO.—307-A LAKE ST.—MAYWOOD, ILLINOIS

REFRIGERATION EQUIPMENT FOR MORE ECONOMICAL OPERATION

National units including coin changers, rejectors, penny refunders, actuators and other National equipment. The new service engineers are as follows: John Gratkins, Atlanta; Errol Bobbert, Toronto; Robert Smith, Los Angeles; Norman J. Burzen, Chicago; John Whelan, Dallas; Tom B. Lewars, New York.

Dole Names De Baugh District Sales Manager

THE appointment of Howard W. DeBaugh, former Dole Applications Engineer, to District Sales Manager, Chicago, Metropolitan Area, is announced by The Dole Refrigerating Company, Chicago. Mr. DeBaugh, a veteran of over nine years

Howard W. DeBaugh

service in the Dole Sales organization, takes over the post vacated by the retirement of L. E. Smith.

Allied Chemical Increases Capacity

BY THE end of 1955 productive capacity for fluorinated hydrocarbon refrigerants, aerosol propellents, and related chemicals in this country should be sufficiently large to "meet all of the industry's need for the foreseeable future." This forecast was made by General Chemical Division, Allied Chemical & Dye Corporation, as the company reported completion of several major expansions at its Baton Rouge (La.) works.

In the past twelve months, the company has doubled its capacity for "Genetrons" 11 and 12 (trichloromonofluoromethane and dichlorodifluoromethane) which are the two most widely used refrigerants and aerosol propellants. During the same period, General added large new facilities for commercial production of two other refrigerants, monochlorodifluoromethane ("Genetron" 141), trichlorotrifluoroethane ("Genetron" 226), and two aerosol propellents, dichlorotetrafluoroethane ("Genetron" 320) and ethylidene fluoride ("Genetron 100). Extensive facilities were also put on stream for trifluorochloroethlene ("Genetron" 265) which is the monomer for manufacture of special fluorinated plastics used for heavy-duty industrial purposes.

By mid-year, General expects to have an additional new "Genetron" plant in operation at Danville, Illinois to serve mid-west producers of aerosols and air conditioning and refrigeration equipment.

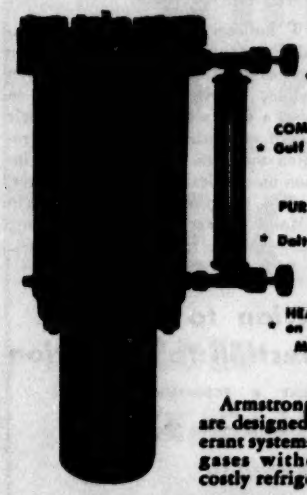
CATALOGS AND BULLETINS

New B&G Catalog

A NEW 24-page catalog featuring a complete line of equipment for forced hot water heating systems and chilled water cooling systems was announced by Bell & Gossett Co., Morton Grove, Ill.

The Company reports that new products and reference to many new applications makes this the most complete product catalog it has ever published. There are nine pages of information on a complete line of circulating pumps for dozens of applications. All-bronze pumps for circulating service water and silent operating centrifugal pumps for boosting water pressures in homes, factories, etc., are a few of the new applications. Valves, fittings, air vents, air tanks and water heaters are also described in detail.

These People* have Profited . . . You Can Too!



5% GREATER CAPACITY, $250 MONTHLY POWER SAVING
* Planters Nut & Chocolate Company, Suffolk, Va.

COMPRESSOR CAPACITY RAISED 10%
* Gulf Oil Corporation wax plant, Philadelphia, Pa.

PURGER PAID FOR ITSELF IN 30 DAYS
* Dalton Ice Co., Dalton, Ga.

HEAD PRESSURE 50 LBS. LOWER
* on 90 ton ammonia system Mayo Hotel, Tulsa, Okla.

Armstrong Forged Steel Purgers are designed to *completely* rid refrigerant systems of all non-condensable gases without wasting a lot of costly refrigerant.

SEND FOR BULLETIN NO. 1921 — Contains complete information about the Armstrong Forged Steel Purger. Write:

ARMSTRONG MACHINE WORKS
860 Maple Street, Three Rivers, Mich.

ARMSTRONG FORGED STEEL PURGER

Satisfaction Guaranteed

Efficient Designs For Long Life And Low Maintenance

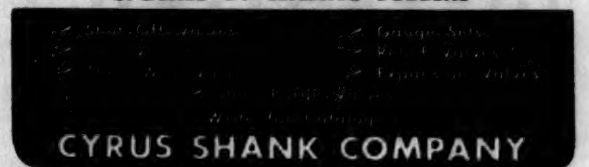
SHANK AMMONIA VALVES

Shank Valves have earned a reputation for high quality, long life and dependable products.

Built of highest grade materials with close tolerances —will stand most rigid inspections.

Largest line of Ammonia All-Steel Bar Stock Valves in the industry. Completely Cadmium plated.

STOCKED BY LEADING JOBBERS

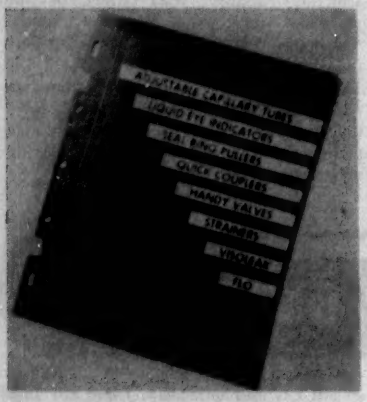


CYRUS SHANK COMPANY

4650 WEST 12TH PLACE CHICAGO 50, ILLINOIS

New Allin Catalog

THE NEW D-55 Catalog produced by the Allin Mfg. Co. for distribution to the trade has been announced. The catalog illustrates and describes the expanded line of Liquid Eye indicators showing sizes and styles now being manufactured. The catalog includes ¼ through ⅝ inch flare and sweat tube sizes, ¼ through 1⅝ inch



sweat tube sizes, and iron pipe sizes from ⅛ through 1¼ inches. Other stock items in the catalog are Adjustable Capillary Tubes, Strainers, Quick Couplers, Handy Valves, Flo, and Visoleak. Newest items in the Allin line are the all-copper spun Liquid Eye known as the 2000 Series in ¾ and ⅞ inch sizes and the all-steel Liquid Eye in ¾, 1 and 1¼ inch iron pipe sizes.

New Catalog on Acme Dry-Ex Liquid Chiller

A NEW eight-page catalog describes Acme Dry-Ex liquid chiller. The advantages shown for Acme's Thru-Tube construction, with job-selected, multi-pass heads at both ends of the shell, include controlled high refrigerant velocity, low refrigerant pressure drop, positive oil return, and tubes that are individually cleanable and replaceable. Ninety-seven standard sizes with capacities ranging from five through 300 tons are listed, along with detailed specifications and a simplified, time-saving selection procedure.

Booklet on Sodium Nitrate As Rust Inhibitor

DETAILED information on the use of sodium nitrite as an inexpensive and efficient rust and corrosion inhibitor is presented in a new booklet offered by the Solvay Process Division of Allied Chemical & Dye Corporation. Entitled "Sodium Nitrite for Rust and Corrosion Prevention", the booklet covers the use of the product alone to protect metal surfaces, primarily iron and steel, or combinations of sodium nitrite with such materials as caustic soda or phosphates for dual purpose applications.

The text of the new booklet, fully illustrated to show commercial applications, describes in detail: how sodium nitrite protects against rust and corrosion; the use of sodium nitrite in combinations with other materials; specific applications; means of testing working solutions; and how to handle and store the product. An extensive bibliography is included to provide the reader with additional sources of information on the many and diverse applications of sodium nitrite in the corrosion field.

Adjustable Ramp for Loading Docks

A CATALOG describing adjustable ramp for loading docks has been issued by Rowe Methods, Inc., Cleveland, Ohio. These adjustable ramps bridge the difference in height between loading docks and any truck or trailer so that shipments may flow directly in and out. They support loads up to rated capacity. They are available in two types to meet various means. Divided into two sections and hinged to forward edge of the dock they compensate for small variations in truck bed heights. Two section bridge plates are hinged to the forward edge of pit to compensate for angular changes and are movable for access to trunnions. They are controlled from a wall-mounted momentary contact double push-button station and use an additional on-off selector switch. The catalog gives further details regarding construction and use and a diagrammatic sketch showing construction operation.

Bulletin on Packaged Liquid Chillers

PACKAGED Liquid Chillers is subject of new bulletin offered by Worthington Corporation, producers of wide range of machinery and equipment for industry, public works and the home in fifteen plants in the U. S. and twelve in foreign countries.

Designed for air conditioning and industrial application, the Worthington line of liquid chillers range from 7½ to 150 hp in a variety of models and combinations offering such advantages as lowcost operation; ease of installation; trouble-free operation. Heart of the compact units, which require minimum floor space, is the Worthington "Million Dollar" compressor. Pictorially and graphically illustrated, the new bulletin gives specifications, dimensions and applications of variously sized liquid chillers.

Crane Cab Air Conditioned

CASE Report No. 100, recently published by Dravo Corporation, Pittsburgh, Pa., describes how a hot and fume-enveloped crane in a steel forging plant was kept in continuous service by air conditioning the cab for operator comfort. Results are outlined by the plant engineer. Previous to the installation, heat and fumes arising from the furnaces and oil quenching baths made working conditions intolerable for the operator. Surrounding air temperature averaged 140 to 160 degrees F. Furthermore, he was exposed to radiant heat of 1,100 degrees F when directly over the furnaces.

Bulletin on Pumps

A NEW bulletin on Monobloc Centrifugal Pumps used in air conditioning systems, has been issued by Worthington Corporation, Harrison, N. J. It lists in table form a wide selection of pumps, their ratings and capacities for approximate refrigeration tonnages. A chart provides information on net dealer prices, horsepower, weight, and pump sizes and types. Drip Proof Motor dimensions are listed along with corresponding frame and pump sizes.

FIRE BAN
INSULATION COATING
for Corkboard, Foamglas, Styrofoam, Rock Cork, Fiberglas, Rubatex, etc. Applied in one coat by trowel, spray or brush to Walls, Ceilings in Cold Rooms. On ducts, tanks, pipes, etc. Interior, exterior.

Fire-Retardant Protection to Premises
Impact-Resistant Protection to Insulation

WASHABLE • PERMANENT • ECONOMICAL

APPLIED IN ONE COAT. *Monolithic surface. No Scoring.*

LIGHT WEIGHT. *No strain in backing adhesives.*

WHITE COLOR. *80% light reflectivity. 13 colors. May be applied at 0° and above. Temperature range −100° to +300° F. Non-Dusting. Non-Toxic. Inhibits fungi. Listed by U.L. Thoroughly field-tested. Widely used. Available through insulation contractors.*

FREE SAMPLES. *Applied to any type insulation. Please specify type. Bulletin 54 mailed upon request.*

Territories available to Distributors — Write

Sole Mfrs: E. H. O'NEILL FLOORS COMPANY • 2523 S. 50th Ave., Cicero, Ill.

Refrigeration Components Shown in New Catalog

SMALL TONNAGE condensers, both shell and tube and shell and coil types, 3 to 150-ton heat exchangers and liquid receivers, and a range of Hi-Peak water coolers are the subject of a new 4-page catalog now available from Acme Industries. Ample data for selecting the proper units are given along with brief descriptions of all major construction features. Selection of Hi-Peak remote storage-type water coolers is simplified by a water range curve combined with performance curves for both intermittent and continuous operation of the seven models. Catalog No. 300 is available from Acme Industries, Inc., Jackson, Michigan.

Cooling Water

A WELL prepared and printed brochure on cooling towers bearing title "Cooling Water for Industry," has been issued by The Fluor Corporation, Los Angeles, Calif. It provides a description of Fluor induced-draft cooling tower construction. The brochure is illustrated with photographs, sketches, cutaway and exploded drawings showing the detail of structural and mechanical equipment. Advantages of "Counterflo" design, methods of water distribution, and all components (framework, filling, sheathing, driving mechanisms, etc.) are described in detail.

Bulletin Describes Sea Water Condenser

A TWO-PAGE bulletin published by Halstead & Mitchell of Pittsburgh, Pa., gives detailed information on the company's double-tube, counter-flow sea water condenser. These cleanable units are made with cupro-nickel water tubes and naval brass headers, and are for marine use and for all other "bad water" conditions. They provide up to 50 percent more heat transfer surface than is found in standard fresh-water condensers, it is claimed.

Because water tubes are easily accessible at both ends, a Halstead & Mitchell spiral cleaning tool can clean and restore cupro-nickel water surfaces to original heat exchange efficiencies. Charts show water consumption versus inlet water temperature and water pressure drop versus water flow. Complete mechanical specifications are also provided.

Choosing Right Valve

A NEW 20-page, 2-color, illustrated pamphlet bearing title "Choosing the Right Valve" is offered by the Crane Co., Chicago, Ill.. Text is a handy refresher in application of basic valve designs for specifiers and buyers of piping equipment. Valve types, design, check valves, names of valve parts, and many other practical valve topics are covered in the pamphlet.

New Plastic Pipe and Fittings Catalog

HOW to use and specify rigid plastic pipe and fittings is the subject of a new 12-page catalog of its standard line offered to design, maintenance and application engineers, by Alpha Plastics, Inc., 14 Northfield Road, West Orange, New Jersey. It was created to enable engineers to learn the modern uses for plastic pipe to keep their methods in step with product processing and maintenance improvements.

The catalog provides useful reference facts on its ½ to 4 inch line of normal impact (Alpha 101) and high impact (Alpha 103) unplasticized polyvinyl chloride pipe and fittings, plus properties and characteristics data, together with detailed drawings and specifications of solvent-type fittings plus the new, injection-molded threaded fittings.

Featured is a corrosion chart classifying more than 275 corrosives rated according to desirability of use with Alpha 101 and Alpha 103 piping. Recommended and non-recommended applications are shown, based on company tests, user reports and field experience.

Ease of workability, installation of Alpha plastic pipe in piping systems plus per ft. costs in schedules 40 and 80 pipe and ordering information, is included. Catalog will be distributed by the company to qualified industrial engineers upon letterhead request.

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ICE CAN GRIDS

Industrial Trucks and Trailers

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BALLARD SALES COMPANY
COMPLETE SUPPLIERS TO THE ICE INDUSTRY

Florida Ice Company Modernizes Plant Provides Better Service To Customers

The newly rebuilt ice plant of the Royal Palm Ice Company, Miami, Florida

THE Royal Palm Ice Company Miami, Fla. recently rebuilt its Coconut Grove plant located at 3101 Douglas Road and U. S. Highway 1. This plant, which has been in continuous operation since the early 1920's, is in a most desirable location inasmuch as it is viewed by the thousands of tourists traveling the Highway south to the Florida Keys and to Key West.

The modernization program included installation of new oil engine equipment and the latest in harvesting equipment, renovating the freezing tanks and beautifying the interior and exterior of the plant building. Last summer, a 300 ton ice storage room was added and the processing room redesigned and rebuilt. New processing equipment was installed and a new system of conveyors to move ice from the freezing tanks to the processing room and from the processing room to loading platforms. In addition, four vending machines were installed to serve block, crushed and cubed ice to the platform trade.

Reduces Labor Costs

Installation of this automatic equipment has resulted in better service to retail customers and a saving in labor costs. The 300 ton ice storage room will be used to supplement the ice supply of the company's Homestead plant during the winter car icing seasons.

Reconditioning this plant is in line with a long established policy of the company to maintain its plants for maximum efficiency, attractiveness and sanitation. The modernized Coconut Grove plant is considered to be an outstanding example.

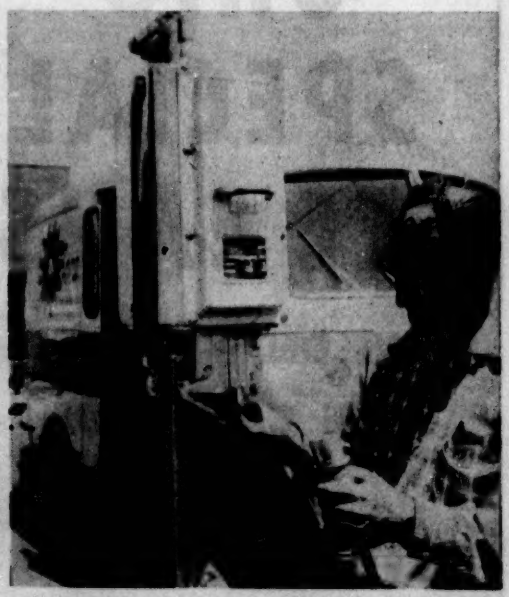
Refrigeration Units in Dairy Delivery Trucks Charged Overnight

A 100 PERCENT refrigerated delivery system, recently introduced at the Menands, New York, milk plant of the Borden Company, keeps the plant's fleet of 51 delivery trucks refrigerated at a constant 40-degree temperature.

A 54,000 square foot parking area at the plant has been equipped with 60 Crouse-Hinds DBR Interlocking Circuit Breaker stations and plug-receptacles. Each vehicle has its own refrigeration unit and special insulation cabinet. The self-contained refrigeration units eliminate the icing down of cases.

At the end of a work day, the driver has his truck reloaded for the next day's run, and then parks it at one of the circuit breaker stations. These are mounted conveniently on a steel rack in the center of the parking area. He removes a length of rubber-covered cable attached at one end to the van refrigeration unit and at the other to a Crouse-Hinds APJ plug. By inserting the plug into the breaker interlocked receptacle, he causes 220 volts to feed the truck refrigeration unit for the rest of the night. The next morning, after removing and replacing the plug, he drives off, in a vehicle stored with dairy products that will remain adequately chilled for the remainder of the day.

Throughout the delivery period, a special insulated cabinet on each truck keeps dairy products at a constant 40-degree temperature. During the night, the trucks' refrigeration units are kept in operation to maintain this temperature.



Designed for outdoor use, the circuit breakers are housed in dust-tight, weather-resistant boxes. Circuit breaker cannot be turned on, unless plug is fully inserted.

Classified Advertising

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: 20c per word; minimum 25 words. $2.00 per line for bold face headings: $15.00 per inch for line listings.

ICE PLANTS—for sale

FOR SALE—27 ton ice plant. 8 x 8, 6 x 6, 5 x 5 compressors. Striper and crusher. On main highway; only ice plant in small, good business town. Address Box MR-8, c/o Industrial Refrigeration, 435 N. Waller Ave., Chicago 44, Ill.

FOR SALE—15 ton York ice plant. 10"x7" Worthington booster compressor. 3 x 3, 4 x 4, 5 x 5, 6½ x 6½, 8 x 8, 9 x 9 York compressors. Write E. Niebling, 1546 St. Clair Ave., Mt. Healthy, Cincinnati 31, Ohio.

FOR SALE
COMPLETE COLD STORAGE WAREHOUSE

365,000 cubic foot fireproof concrete-brick warehouse. Mostly freezers — 5 car private siding. Truck dock facilities. Only plant of its kind between Pittsburgh, Cleveland and Erie. Presently filled to capacity by regular name brand storage accounts and two lease tenants. Owners are too diversified and wish to concentrate their interests in other lines of the business. Contact G. S. Warren Jr., Box 318, Sharon, Penna.

FOR SALE—USED ICE PLANTS & REFRIGERATING EQUIPMENT
Complete Ice Plants 20 to 100 Tons
Ammonia Compressors, 3" x 3" to 12½" x 14½"
Condensers, Cranes, Blowers, Scoring Machines, Ice Canes—Various sizes, 100# — 300# Ice Cubers.
Write or wire us on any equipment you may need.
ENTERPRISE EQUIPMENT CORPORATION
77-79 Alexander Street, Yonkers, New York
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The "knowhow" of nearly 40 years of specialization in pipe fabrication back every job produced by our master metalworkers. You can confidently entrust your work to us. . . even stainless steel, or up to 6-inch extra heavy. Complete welding facilities.

May we quote on your next job.

CHICAGO NIPPLE MANUFACTURING CO.

USED EQUIPMENT—wanted & for sale

FOR SALE—Sprinkman refrigerator door, for a 3'0 x 6'4" opening; very good condition. Level Valley Dairy Co., Route 1, West Bend, Wis.

FOR SALE
12½ x 14½ York — 10x10 York 125 h.p.
9x9 York 75 h.p. —
10x10 York with Unaflow steam engine.
7½ x 7½ York V-drive 60 h.p.
2—18"x18' enclosed condensers
11x22x30" ice cans — Uline ice scoring machine.
3—50 h.p. Freon compressors with Defusers & condensers.
JOHN F. CARSON
"A" & Venango Sts. Philadelphia 34, Pa.
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The classified section is the market place of the industry. Get fast action on equipment you want to buy or sell. Buyers are watching for equipment they can use. Convert idle equipment into cash. INDUSTRIAL REFRIGERATION classified rates are low — results quick.

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11 PARK PLACE NEW YORK 7, N. Y.

USED EQUIPMENT—Continued

FOR SALE—Two 8 x 8 YORK Ammonia compressors with or without motors. 150 ice cans 11 x 22 x 47. Write your needs. Born Company, 80 East Jackson Blvd., Chicago 4, Ill. WAbash 2-5299.

FOR SALE — COMPRESSORS
1 — York 8x8 ammonia compressor complete with direct connected synchronous motor, switch board and M.G. set. 172 r.p.m., 2200 volts, 3 phase, 60 cycle. Price $500.00.
1 — York 10x10 ammonia compressor, force feed lubrication, complete with direct connected synchronous motor, switch board and M.G. set. 172 r.p.m., 2200 volts, 3 phase, 60 cycle. Price $800.00.
TRI-STATE ENGINEERING & SALES INC.
Salisbury, Maryland

WANTED Good used ammonia equipment preferably 4x4. On West Coast. Need complete plant. All parts considered. What have you? Austin Snider, 1604 A. St., Eureka, Calif.

FOR SALE—7½x7½ York No. 267027 with 60 h.p. Century 3-60-440. 10 x 7½ York booster, D-8, No. 221135, with 40 h.p. Century 3-60-440. All installed new in 1947. 75 h.p. GE induction motor, type I-8-75-900 speed full load 860 and controller. 40 h.p. Westinghouse motor 440 volt. Sugar Creek Creamery Co., Danville, Ill.

OWNER WANTS OFFER
1—9 x 9 York Compressor 360 r.p.m., direct connected to 110 h.p. F&M Diesel engine.
1—9 x 9 Frick compressor Type G., 300 r.p.m.
GENERAL MACHINERY & EQUIPMENT CO., INC.
809 Woodland Ave.,
Kansas City 6, Missouri

FOR SALE—Late model Frick 6x6 with motor and vee belts, also 7½x7½, 8x8, 9x9, 10x10, ice plants, cans, cranes, agitators, blowers, Diesels. Parke Pettegrew, 370 West Broad St., Columbus 8, Ohio.

HEAT TRANSFER EQUIPMENT
REMPE CO.
Founded 1890

PIPE COILS—FIN COILS
FOR REFRIGERATION, AIR CONDITIONING, HEATING

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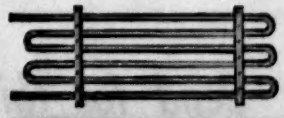

Send your problems to us for engineering assistance.

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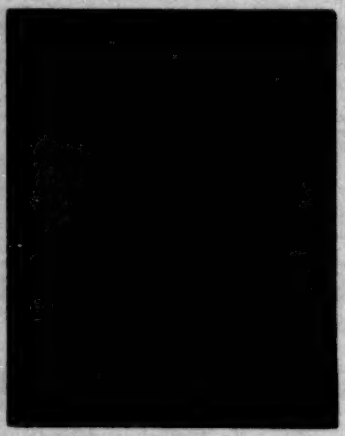

The Book of "Refrigeration Knowledge"

Basic Refrigeration is designed to give a good working knowledge of modern refrigeration principles, equipment and its operation. Beginning with the fundamentals and generally understood materials, it progresses through basic details of equipment to application, operation and servicing of systems.

BASIC REFRIGERATION

PRINCIPLES • PRACTICE • OPERATION

By Guy R. King

29 Chapters—340 ILLUSTRATIONS

526 PAGES

COVERING THESE SUBJECTS

- Fundamentals
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- Evaporators
- Compressors
- Condensers
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- Heat Calculations
- Humidity in Refrigeration
- Compressor Calculations I
- Compressor Calculations II
- Refrigerant Lines—Pressure Drops
- Brine in Refrigeration
- Liquid Cooling
- Complete Systems
- Carbon Dioxide—Dry Ice
- Altitude and Its Effect
- Absorption Systems
- The Refrigeration Code

Different refrigerants and the various sizes of equipment are all given equal treatment. There are no complicated formulae or mathematics in the book. It develops the subject in logical step-by-step method with clear explanation of all factors.

Special drawings supplement the material in the text and explain basic factors. Of some 340 illustrations, the majority are special drawings which detail fundamental points in an easily understood fashion. Frequent examples are worked out in the text to show step by step solutions.

How automatic controls operate and what they do in the system are explained in simple terms. Parts and their functions are shown. This important field, in present-day refrigeration, is covered in a fashion that tells how to use controls and keep them operating to good advantage.

Send for this Book—$6.00

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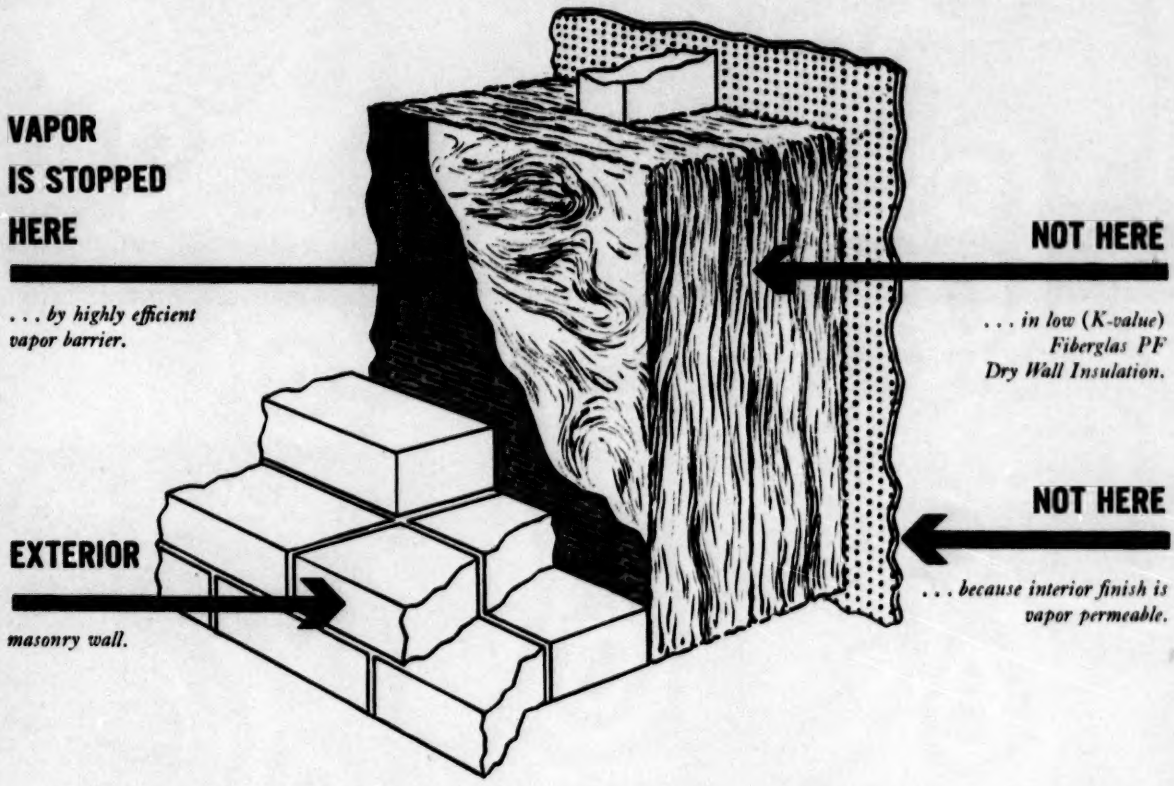

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No "locked-in" moisture to cause trouble in Fiberglas PF dry wall construction

Fiberglas* PF Insulation in dry wall construction stays dry! Here's how. A single warm side barrier stops nearly all vapor. The little that penetrates passes easily through Fiberglas PF *as harmless vapor*. There are no internal barriers to cause vapor to condense into damaging moisture.

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Extremely low thermal conductivity • maximum versatility • a product for every need • low installation and maintenance costs • highly moisture-resistant • easy to cut and apply • good handling characteristics • fibers are glass and will not burn or rot • lightweight • odorless • will not expand or contract • effective for life of building.

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- ☐ Why the Trend is to Fiberglas
- ☐ Insulations for Low Temperature Structures and Equipment
- ☐ PF Design Details

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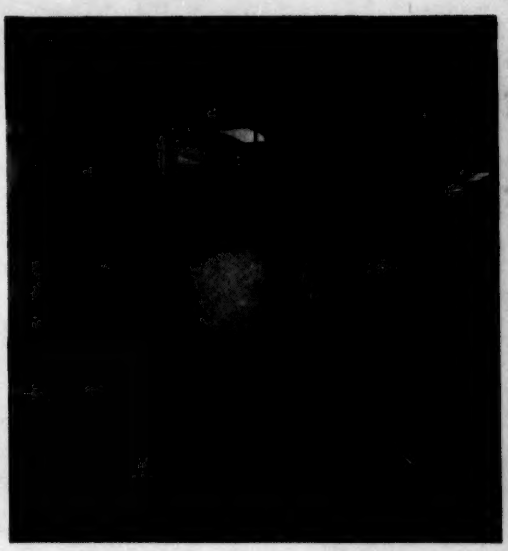
in Kansas City Speeds Handling Assures Maximum Sanitation with JAMISON Doors

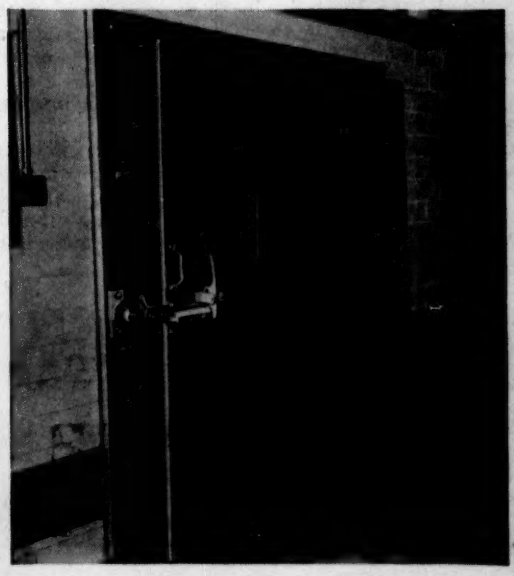
At its huge Distribution Center in Kansas City, Kansas, Safeway Stores protect the pocketbooks of customers through streamlined handling methods . . . safeguards their health by following the best sanitary measures.

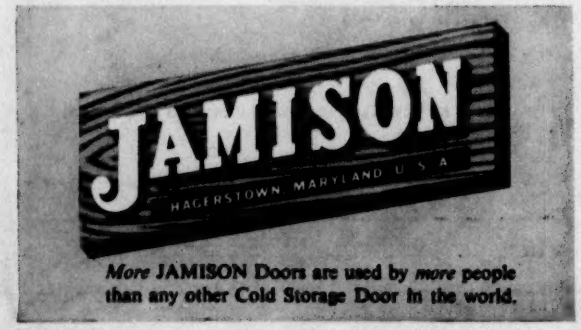
Jamison Doors play a substantial part in this successful operation. Their great width accelerates traffic by giving plenty of clearance. Because they're completely metal-clad, they match the sanitary tile walls in ease of cleaning and attractive appearance.

Jamison Doors of standard or special design can also be supplied to meet your cold storage requirements. For additional information, consult your architect or write to Jamison Cold Storage Door Company, Hagerstown, Maryland, U.S.A.



The Extra Elbow Room Offered by Double Doors keeps traffic moving easily.





More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.